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The Marine Fauna of New Zealand: Benthic Ostracoda (Suborder Myodocopina)

by

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CONTENTS

	Page
LIST OF FIGURES	4
LIST OF TABLES	4
ABSTRACT	5
INTRODUCTION	5
ACKNOWLEDGMENTS	6
LIST OF STATIONS	6
ZOOGEOGRAPHY	7
SYSTEMATICS	8
Suborder Myodocopina Sars, 1866	8
Key to families in the vicinity of New Zealand	8
Family Cypridinidae Baird, 1850	8
Subfamily Cypridininae Baird, 1850	8
Key to genera in the vicinity of New Zealand	8
Metavargula Kornicker, 1970	8
Key to species in the vicinity of New Zealand	9
Metavargula bradfordae n.sp.	9
Metavargula mazeri n.sp.	13
Vargula Skogsberg, 1920	17
Key to species in the vicinity of New Zealand	17
Vargula ascensus n.sp.	17
Cypridinodes Brady, 1902	20
Key to species in the vicinity of New Zealand	21
Cypridinodes concentrica n.sp.	21
Paracypridina Poulsen, 1962	23
Family Philomedidae Müller, 1908	23
Subfamily Philomedinae Müller, 1908	23
Key to genera in the vicinity of New Zealand	23
Scleroconcha Skogsberg, 1920	23
Key to species in the vicinity of New Zealand	23
Euphilomedes Poulsen, 1962	23
Key to species in the vicinity of New Zealand	23
Family Cylindroleberididae Müller, 1906	23
Key to subfamilies	23
Subfamily Cyclasteropinae Poulsen, 1965	23
Cycloleberis Skogsberg, 1920	23
Cycloleberis zealandica (Baird, 1850)	23
Subfamily Cylindroleberidinae Müller, 1906	30
Key to genera in the vicinity of New Zealand	30
Diasterope Poulsen, 1965	30
Diasterope grisea (Brady, 1898)	30
Parasterope Poulsen, 1965	31
Key to species in the vicinity of New Zealand	31
Dolasterope Poulsen, 1965	31
Bathyleberis Kornicker, 1975	31
Synasterope Poulsen, 1965	31
Family Sarsiellidae Brady and Norman, 1896	31
Cymbicopia Kornicker, 1975	31
Key to species in the vicinity of New Zealand	31
LITERATURE CITED	32
PLATES	33

LIST OF FIGURES

	Page
1. *Metavargula bradfordae* n.sp., holotype, adult male	10
2. *Metavargula bradfordae* n.sp., holotype, adult male	11
3. *Metavargula mazeri* n.sp., holotype, female, probably adult	13
4. *Metavargula mazeri* n.sp., holotype, female, probably adult	14
5. *Metavargula mazeri* n.sp, holotype, female, probably adult	15
6. *Vargula ascensus* n.sp., holotype, adult female	18
7. *Vargula ascensus* n.sp., holotype, adult female	19
8. *Vargula ascensus* n.sp., holotype, adult female	20
9. *Cypridinodes concentrica* n.sp., paratype, adult female	22
10. *Cycloleberis zealandica* (Baird, 1850), juvenile female	25
11. *Cycloleberis zealandica* (Baird, 1850), juvenile female	26
12. *Cycloleberis zealandica* (Baird, 1850), juvenile female	27
13. *Diasterope grisea* (Brady, 1898), adult female	31

LIST OF TABLES

	Page
1. Distribution and depth range of myodocopid Ostracoda in the vicinity of New Zealand	6
2. Distribution of filaments on sensory bristle of 5th joint of first antenna in *Cycloleberis zealandica*, female, A-1 instar?	28
3. Number of bristles on endopodite of second antenna in *Cycloleberis zealandica*, female, A-1 instar?	28

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ABSTRACT

Study of a small collection of New Zealand benthic myodocopid Ostracoda reveals four new species in the genera *Metavargula, Vargula* and *Cypridinodes.* Discovery of a male *Metavargula* facilitates the redefinition of the genus. Confusion over the identity of New Zealand species of *Cycloleberis* is discussed. The new species are described and illustrated, and supplementary descriptions are presented of two previously described species. Keys are presented to all benthic myodocopid Ostracoda that have been reported from the vicinity of New Zealand.

INTRODUCTION

This study is based on samples of Ostracoda collected by personnel of the New Zealand Oceanographic Institute, Wellington, New Zealand, and the University of Canterbury, Christchurch, New Zealand. The collection contains six species: *Cycloleberis zealandica* (Baird, 1850), *Diasterope grisea* (Brady, 1898), *Cypridinodes concentrica* n sp., *Metavargula bradfordae* n.sp., *Metavargula mazeri* n.sp., and *Vargula ascensus* n.sp., and is of particular interest because it contains many specimens of *Cycloleberis*. Four species of *Cycloleberis* had previously been described from the vicinity of New Zealand, three of these very poorly. As a result of the present study it is tentatively concluded that all four species are conspecific and are referable to *Cycloleberis zealandica* (Baird, 1850).

In addition to the descriptions of species in the collection, keys are presented to all benthic myodocopid Ostracoda that have been reported from the vicinity of New Zealand. A list of the species, together with their distribution and depth ranges, is given in Table 1.

The magnification given for each micrograph in the Plates is that to which the micrograph has been reduced for publication.

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TABLE 1. Distribution and depth range (m) of myodocopid Ostracoda in vicinity of New Zealand

Species	Three Kings Islands	North Island	Cook Strait	South Island	Chatham Island	Stewart Island
CYPRIDINIDAE						
Codonocera cruenta Brady, 1902	planktonic					
Paracypridina aberrata Poulsen, 1962	130					
Bathyvargula walfordi Poulsen, 1962				610		
Cypridina inermis (Müller, 1906)		planktonic				
Cypridinodes reticulata Poulsen, 1962				610		
Cypridinodes concentrica n. sp.					384	
Metavargula iota Kornicker, 1975			117			
Metavargula bradfordae n. sp.		1375				
Metavargula mazeri n. sp.					384	
Vargula ascensus n. sp.				240–300		
Vargula stathme Kornicker, 1975			117			
PHILOMEDIDAE						
Scleroconcha arcuata Poulsen, 1962			117–146	1.8–9.1		
Scleroconcha sculpta (Brady, 1898)				planktonic*		
Scleroconcha flexilis (Brady, 1898)				1.8–11		9.1–12.8
Scleroconcha wolffi Kornicker, 1975				11		
Euphilomedes agilis (Thomson, 1879)		intertidal		intertidal?, planktonic*		
SARSIELLIDAE						
Cymbicopia brevicosta Kornicker, 1975				1.8–11		
Cymbicopia hanseni (Brady, 1898)				1.8–11		
Cymbicopia hispida (Brady, 1898)				1.8–11		
Cymbicopia zealandica (Poulsen, 1965)						10–15
CYLINDROLEBERIDIDAE						
Bathyleberis oculata Kornicker, 1975			117			
Parasterope pectinata Poulsen, 1965	100					
Parasterope quadrata (Brady, 1898)				1.8–9.1		
Parasterope ?quadrata (Brady, 1898)				1.8–9.1, planktonic*		
Parasterope crinita Kornicker, 1975				51		
Synasterope empoulseni Kornicker, 1975	110?					10–15
Diasterope grisea (Brady, 1898)				11–14		
Dolasterope johansoni Poulsen, 1965				139		
Cycloleberis zealandica Baird, 1850		5.5–65	91	1.8–14		Rock pools

*Usually benthic, occasionally collected above bottom.

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LIST OF STATIONS

N.Z. Oceanographic Institute Station Lists are in abbreviated form, particularly in field notes where records of individual occurrences of animals noted in the field but not relevant to this paper have been omitted. To assist in referring to material from other institutions, where station numbers are not available, a running sample number is given, distinguishable from station numbers by the absence of a letter prefix. The

following abbreviations for equipment are used: GHO–Hayward orange-peel grab (with metal plates added); GSM–Smith-McIntyre grab; TAM–Agassiz trawl with 4′ netting bag.

New Zealand Oceanographic Institute (NZOI)

A910 (13 Sept. 1963) 43° 04′S, 178°39′W. Manihiki dredge.
Depth 549 m.
Vargula ascensus: 1 ovigerous female and 1 juvenile

C853 (2 Mar. 1962) 40°38′18″S, 174°05′ 12″E. GHO.
Depth 91 m.
Cycloleberis zealandica: 1 juvenile female

F869 (2 Oct. 1968) 37°24′S, 179°15′E. TAM.
Depth 1375 m.
Metavargula bradfordae: 1 adult male

G388 (6 Feb. 1968) 43°35′S, 178°03′W. Dredge.
Depth 384 m.
Cypridinodes concentrica: 3 ovigerous females and 1 adult female
Metavargula mazeri: 1 female

G694 (21 Jan. 1970) 46°20′S, 169°52′E. TAM.
Depth 14 m.
Cycloleberis zealandica: 3 juveniles

J890 (22 Jan. 1976). Offshore from Marsden Power Station, just south of Whangarei Harbour, north-east coast of North Island.
Depth 5.5 m.
Cycloleberis zealandica: 1 juvenile

J891 (22 Jan. 1976). Offshore from Marsden Power Station, just south of Whangarei Harbour, north-east coast of North Island.
Depth 5.5 m.
Cycloleberis zealandica: 2 juveniles

J892 (22 Jan. 1976). Offshore from Marsden Power Station, just south of Whangarei Harbour, north-east coast of North Island.
Depth 5.5 m.
Cycloleberis zealandica: 1 juvenile

J896 (22 Jan. 1976). Offshore from Marsden Power Station, just south of Whangarei Harbour, north-east coast of North Island.
Depth 7.4 m.
Cycloleberis zealandica: 1 juvenile

K126 (5 Apr. 1971) 41°10′30″S. 173°09′48″E. GSM.
Depth 14 m.
Cycloleberis zealandica: 1 juvenile
Diasterope grisea: 1 adult? female

K142 (5 Apr. 1971) 41°10′30″S. 173°09′ 48″E. GSM.
Depth 14 m.
Cycloleberis zealandica: 3 juveniles

K144 (5 Apr. 1971) 41°10′30″S, 173°09′48″E. GSM.
Depth 14 m.
Cycloleberis zealandica: 1 juvenile

K146 (5 Apr. 1971) 41°10′30″S, 173°09′48″E. GSM.
Depth 14 m.
Diasterope grisea: 1 specimen

K152 (5 Apr. 1971) 41°10′30″S, 173°09′48″E. GSM.
Depth 14 m.
Diasterope grisea: 1 adult female

K154 (5 Apr. 1971) 41°10′30″S, 173°09′48″E. GSM.
Depth 14 m.
Diasterope grisea: 1 specimen

K164 (2 May 1971) 41°10′24″S, 173°09′57″E. GSM.
Depth 14 m.
Cycloleberis zealandica: 1 juvenile

K170 (2 May 1971) 41°10′24″S, 173°09′57″E. GSM.
Depth 14 m.
Diasterope grisea: 1 adult female

K174 (2 May 1971) 41°10′24″S, 173°09′57″E. GSM.
Depth 14 m.
Diasterope grisea: 1 juvenile

K175 (2 May 1971) 41°10′24″S, 173°09′57″E. GSM.
Depth 14 m.
Diasterope grisea: 1 adult male

K176 (2 May 1971) 41°10′24″S, 173°09′57″E. GSM.
Depth 14 m.
Diasterope grisea: 1 specimen

K178 (2 May 1971) 41°10′24″S, 173°09′57″E. GSM.
Depth 14 m.
Diasterope grisea: 1 adult female with nematodes

K185 (1 July 1971) 41°10′S, 173°10′E. GSM.
Depth 14 m.
Cycloleberis zealandica: 1 juvenile male

Zoology Department, University of Canterbury

[1] (Aug. 1957) approximately 40°38′S, 173°05′E. Menzies Bay (near Lyttelton Harbour), Banks Peninsula.
Cycloleberis zealandica: 7 specimens

ZOOGEOGRAPHY

Brodie (1973: table 3.1) listed the percentages of marine species endemic to New Zealand and the percentages found in other areas in addition to New Zealand. The faunal groups in that list are: thecate hydroids, ascophoran bryozoans, echinoids, asteroids, holothurians (non-bathyal), crabs, and spider crabs. The percentages of endemic species range from 46 for thecate hydroids to 83 for non-bathyal holothurians. The percentage of endemism for benthic myodocopid ostracods is 100 percent, which is higher than for the other taxa. This could, in part, be the result of the absence of planktonic larval stages in the ontogeny of benthic myodocopids. Most other faunal groups listed by Brodie contain some species having planktonic larvae, which may be widely dispersed by oceanic currents in the vicinity of New Zealand.

Another reason for the high endemism of New Zealand benthic myodocopids may be the incomplete knowledge of Australian and Indo-Pacific Myodocopina. In Brodie's list, the percentage of species that live both in the vicinity of New Zealand and Australia ranges from 10 to 24, and the percentage of species

that live both in the vicinity of New Zealand and in the Indo-Pacific ranges from 0 to 20. When the myodocopids of those areas are better known, it may be found that some New Zealand species also live there. For instance, *Vargula ascensus* n. sp., may be conspecific with an ostracod from the south-east coast of Australia identified by Poulsen (1962: 182) as *Vargula antarctica*.

Antarctic myodocopids are fairly well known (Kornicker 1975a), permitting a conclusion that the absence of species which occur both in the vicinity of New Zealand and Antarctica is probably real, or at least, that additional studies are not likely to find many species living in both areas. According to Brodie (1973: 85) very few species in other taxa are found in both places. *Vargula ascensus* n.sp. is morphologically closely related to an Antarctic species, *Vargula antarctica*.

Using the Simpson Index, Kornicker (1975a: 31) calculated the faunal resemblance at the generic level between New Zealand and South and South-West Africa, Australia, South America, and Antarctica, for specimens living on the continental shelf and slope (0–2000 m). The indices range from 27 to 36. Because of the incomplete knowledge of myodocopids living in some of the areas, the differences in the indices is probably not significant. The Simpson Index for myodocopid genera from New Zealand and the Gulf of Naples, Italy, is 30. The similarity of this index to those of the closer areas suggests that the basic distribution of myodocopid genera is extremely ancient, possibly related to Gondwanaland. One myodocopid genus, *Cymbicopia* Kornicker, 1975, is endemic to New Zealand.

Kornicker (1975a: 34, figure 10) included New Zealand in his *Cypridinodes biofacies* which includes Australia and the Indo-West-Pacific region. A relationship of the faunas of New Zealand, Australia, and the Indo-Pacific is also indicated by other taxa (Brodie 1973: 85).

SYSTEMATICS

Suborder MYODOCOPINA Sars, 1866

This suborder contains five families: Cypridinidae, Philomedidae, Cylindroleberididae, Sarsiellidae, and Rutidermatidae. The latter family has not yet been recorded from the vicinity of New Zealand.

Key to Families in the Vicinity of New Zealand

1 Posterior part of body with 7–8 gill-like structures ..... CYLINDROLEBERIDIDAE
Posterior part of body without gill-like structures 2
2 Exopodite of mandible well developed, at least half length of dorsal margin of 1st endopodite joint 3
Exopodite of mandible missing or minute, less than one-third length of 1st endopodite joint ..... SARSIELLIDAE
3 Exopodite of 5th limb well developed and bearing strong pectinate teeth 4
Exopodite of 5th limb greatly reduced and with, at most, weak finger-like teeth ..... PHILOMEDIDAE (adult males)
4 Second joint of exopodite of 5th limb forming large squarish tooth ..... PHILOMEDIDAE (females and juvenile males)
Second joint of exopodite of 5th limb without large squarish tooth ..... CYPRIDINIDAE

Family CYPRIDINIDAE Baird, 1850

The family Cypridinidae contains two subfamilies, Cypridininae Baird, 1850, and Azygocypridininae Kornicker, 1970. Only the former has been collected in the vicinity of New Zealand.

Subfamily CYPRIDININAE Baird, 1850

This subfamily was represented in the collections by members of three genera: *Cypridinodes* Brady, 1902, *Vargula* Skogsberg, 1920, and *Metavargula* Kornicker, 1970. Other genera in this subfamily that have been reported from the vicinity of New Zealand are *Codonocera* Brady, 1902, *Cypridina* Milne-Edwards, 1840, *Monopia* Claus, 1873, *Paracypridina* Poulsen, 1962, and *Bathyvargula* Poulsen, 1962. *Codonocera*, *Cypridina*, and *Monopia* are pelagic genera not discussed in this paper, but are included in the key to genera of the subfamily.

Key to Genera in the Vicinity of New Zealand

1 Furca with 4 claws on each lamella ..... *Codonocera*
Furca with 5 claws on each lamella ..... *Monopia*
Furca with more than 5 claws on each lamella 2
2 Upper lip with 2 unpaired anterior processes ..... *Cypridina*
Upper lip without 2 unpaired anterior processes 3
3 Upper lip with serrated process on long paired tusks ..... *Cypridinodes*
Upper lip without serrated process on long paired tusks 4
4 Endopodite of female 2nd antenna 3-jointed ..... *Vargula*
Endopodite of female 2nd antenna 1-jointed, or with short 2nd joint 5
5 Sensory bristle on 5th joint of female 1st antenna with short proximal filaments ..... *Paracypridina*
Sensory bristle on 5th joint of female 1st antenna with long proximal filaments 6
6 Bristle on 2nd joint of exopodite of 2nd antenna with 1 ventral spine ..... *Bathyvargula*
Bristle on 2nd joint of exopodite of 2nd antenna with numerous ventral spines ..... *Metavargula*

Metavargula Kornicker, 1970

TYPE-SPECIES: *Metavargula ampla* Kornicker, 1970

DISTRIBUTION: Gulf of Mexico (at depths of 1000–1200 m), Peru-Chile Trench off Peru (1927–1997 m), Tasman Plateau (1790–1803 m), Weddell Sea (650 m), Scotia Ridge (2800–2837 m), Drake Passage (3724–3825 m), Falkland Trough (2155–2453 m), Strait of

Magellan (255 m), Cook Strait (117 m), and continental slope east of New Zealand (1118–1653 m).

Two species, *M. bradfordae* n.sp., and *M. mazeri* n.sp., were present in the collection just examined. Kornicker (1975a: 138) previously described *Metavargula iota* from Cook Strait at a depth of 117 m. The discovery of a *Metavargula* male (*M. bradfordae*) permits amendment of the generic diagnosis to include the previously unknown male.

DIAGNOSIS

Carapace: Oval in lateral view with small incisur and posterior caudal process. Length of known species 2.84–6.31 mm. List on infold anterior to caudal process with minute processes forming row.

First antenna: Sensory bristle of 5th joint of female with long slender proximal filaments, of male with long, broad, oarlike proximal filaments.

Second antenna: Endopodite with short 1st joint bearing 4–5 bristles, distal of these longer than others; 2nd joint small, not always distinctly separated from 1st joint, with long terminal bristle; on some specimens a 3rd endopodial joint only slightly wider than base of bristle present. On the latter specimens the terminal bristle is on the 3rd joint, and the short 2nd joint is bare. Bristle on 2nd joint of exopodite with five or more ventral spines; basal spines present on exopodial joints 2–8, and lateral spine or spines present on 9th joint.

Mandible: Medial bristle on ventral margin of 2nd endopodial joint broad and with stout spines or teeth along dorsal margin.

Sixth limb: Third and 4th endites usually without medial bristles.

Seventh limb: Comb with slender recurved teeth, without short flat-tipped lateral teeth; 1 slender peg opposite comb.

Furca: Each lamella with 7–9 claws, each claw separated from lamella by suture.

Rod-shaped organ: Short, finger-like.

Eyes: Medial eye large, pigmented. Lateral eyes absent or reduced.

Upper lip: Anterior part large, undivided, with terminal glandular field; a pair of long tusks posterior to anterior glandular field.

REMARKS: The adult male of this genus was previously unknown. The broad oarlike filaments on the sensory bristle of the 1st antenna of the male *M. bradfordae* indicates the close relationship of *Metavargula* and *Bathyvargula* Poulsen, 1962, which bears similar filaments.

Key to Species in the Vicinity of New Zealand

1 Height more than 70 percent of length 2
Height less than 65 percent of length 3

2 Carapace shorter than 3.3 mm, lateral eyes absent ..... *M. bradfordae* n.sp.
Carapace longer than 3.8 mm, reduced lateral eyes present ..... *M. mazeri* n.sp.

3 Furca lamella with 8 claws 4
Furca lamella with 9 claws 5

4 Carapace longer than 4.5 mm, 10 bristles in place of epipodial appendage on 6th limb ..... *M. adinothrix* Kornicker, 1975
Carapace shorter than 3.5 mm, 2 bristles in place of epipodial appendage on 6th limb ..... *M. iota* Kornicker, 1975

5 Carapace longer than 4.30 mm, 7th limb with 17–24 bristles ..... *M. ampla* Kornicker, 1970
Carapace shorter than 4.0 mm, 7th limb with 13 bristles ..... *M. optilus* (Kornicker, 1968)

Metavargula bradfordae n.sp. (Figs. 1, 2)

HOLOTYPE: Adult male, on two slides and in alcohol, in collection of the New Zealand Oceanographic Institute, DSIR, Wellington, New Zealand, type number H213.

TYPE-LOCALITY: NZOI Stn. F869, continental slope east of North Island, 37° 24′ S, 179° 15′ E, 1375 m.

ETYMOLOGY: The species is named after Dr Janet M. Bradford, New Zealand Oceanographic Institute.

DESCRIPTION OF ADULT MALE

Carapace: Oval in lateral view with small incisur and prominent dorsally oriented posterior caudal process with open tip (Fig. 1a); valve surface with faint reticulations visible when viewed with transmitted light. Reticulations similar to those on valves of *Metavargula mazeri* (*see* Plates 2a, c, 3a-c).

Infold: Rostral infold with about 30 bristles forming row (Fig. 1b); anteroventral infold with about 5 small bristles along list; list along infold of ventral margin with about 17 small bristles; list anterior to caudal process forming distinct ridge with about 5 short bristles medially, and about 10 minute processes along posterior edge (Fig. 1c).

Selvage: Wide lamellar prolongation present in vicinity of incisur and along anterior margin, narrower along ventral margin, outer margin smooth.
Size: Holotype, length 2.84 mm, height 2.13 mm, height 75 percent of length.

First antenna (Fig. 1d): 1st and 2nd joints bare; 3rd joint with two spinous bristles, one dorsal and proximal, one ventral and terminal; 4th joint with two bristles, one dorsal and subterminal, one ventral and terminal; sensory bristle of 5th joint with seven broad, flat, oarlike filaments near middle; stem of sensory bristle distal to broad filaments with two long proximal filaments and bifurcate tip; medial bristle of 6th joint short, bare. Seventh joint: a-bristle bare, about twice length of bristle of 6th joint; b-bristle about two-thirds length of sensory bristle; with broad proximal bulge bearing short, stout filament having proximal disc and minute distal spine; part of b-bristle distal to stout proximal filament with two or three short, slender, bare filaments, tip bifurcate; c-bristle about twice length of sensory

FIG. 1. *Metavargula bradfordae* n.sp., holotype, adult male, H213: *a*, outline of specimen, length 2.84 mm; b, anterior of left valve, medial view; *c*, caudal process of left valve and detail of list, medial view; *d*, left 1st antenna, medial view; *e*, joints 7–9 of exopodite of right 2nd antenna, lateral view; *f*, bristle of 2nd joint of exopodite of 2nd antenna; *g*, endopodite and distal end of protopodite of right 2nd antenna, lateral view; *h*, right mandible, medial view; *i*, posterior of animal from right.

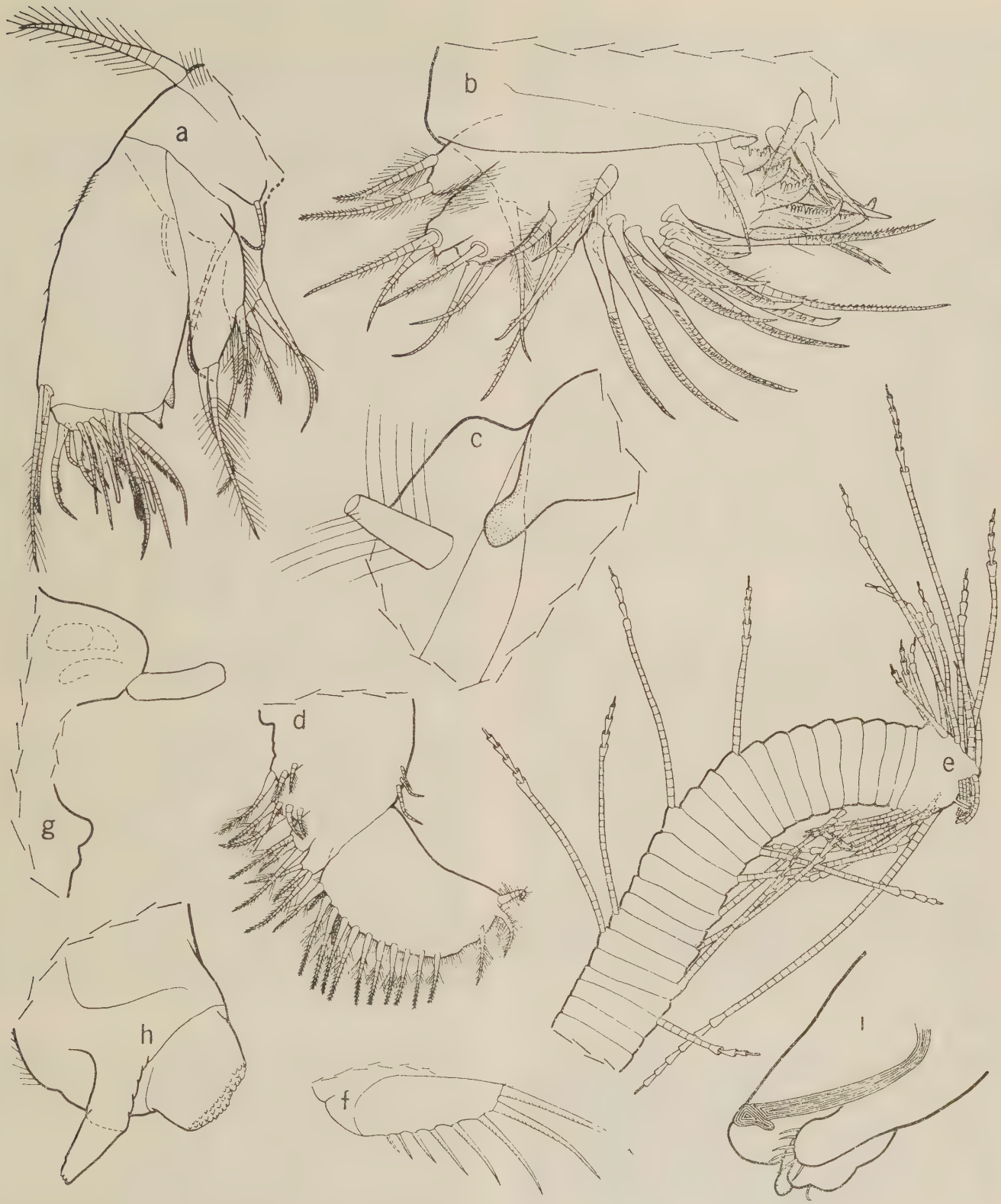

FIG. 2. *Metavargula bradfordae* n.sp., holotype, adult male, H213: *a*, left maxilla, lateral view (some endites not shown): *b*, distal end of left 5th limb, posterior view; *c*, tooth of protopodite of right 5th limb, anterior view; *d*, right 6th limb, medial view; *e*, 7th limb; *f*, right lamella of furca, lateral view; *g*, anterior of body showing medial eye, rod-shaped organ, and anterior process; *h*, upper lip, anterior to right; *i*, left copulatory limb, lateral view.

bristle, with proximal bulge and stout proximal filament bearing proximal disc; part of c-bristle distal to stout proximal filament with six long bare marginal filaments and bifurcate tip. Eighth joint: d- and e-bristles bare, about same length as b-bristle; f- and g-bristles same length as c-bristle, with 6–8 filaments, some with three or more minute teeth, tip of stem bifurcate.

Second antenna: Protopodite with short medial bristle. Endopodite weakly 2- jointed (Fig. 1g): 1st joint short with four bristles, three short, bare, proximal, one long, spinous, distal; 2nd joint short with long bare terminal bristle; endopodite appears to project from lateral side of protopodite. Exopodite: 1st joint bare; joints 2–8 with few short, faint hairs forming short row along distal margin; joint 2 with few short, slender spines in place of basal spine; joints 3 and 4 with short, bifurcate basal spine; joints 5–8 with small basal spine; basal spine of 8th joint about half length of 9th joint; 9th joint with small lateral spine (Fig. 1e); bristle of 2nd joint about one and one-quarter times length of joints 3–9, with about 24 ventral spines, tip of bristle slender, ringed, and with minute spine at tip (Fig. 1f); last ventral spine of bristle of 2nd joint larger than others; bristles of joints with natatory hairs but no spines except for single terminal spine; 9th joint with four bristles, dorsal of these shorter than others, about same length as joints 4 to 9 combined, and with abundant natatory hairs.

Mandible (Fig. 1h): Coxale endite with two stout spines at tip, numerous slender spines, and minute bristle near base. Basale with two short a-bristles with bases on medial side (longer of these with short marginal spines), no b-bristles, two bare c-bristles (one short, one long), and two spinous d-bristles, one short, one long; dorsal margin of basale with three spinous bristles, one distal to middle, two terminal. Exopodite hirsute, reaching just past distal end of 1st endopodite joint, with two subterminal bristles. Endopodite: 1st joint with four ventral bristles, two long, spinous, one short, spinous, one minute, bare; ventral margin of 2nd joint with four distal bristles forming three groups, proximal two groups each with one short, slender, bare bristle, distal group with two bristles (medial of these stouter than other, not separated from joint by suture, and with long dorsal spines); ventral margin of 2nd joint with faint spines; dorsal margin of 2nd joint with about 18 spinous bristles; end joint with three stout claws and four bristles.

Maxilla (Fig. 2a): Endite 1 with about ten spinous bristles, some with knifelike tips; endites II and III each with about five spinous bristles, some with knife-like tips. Coxale hirsute with long, stout, hirsute, dorsal bristle. Basale with one bristle near base of endite III and two bristles along distal margin. Exopodite large with three bristles, proximal bristle and outer of the terminal bristles hirsute, inner terminal bristle with short marginal spines. Endopodite: 1st joint with two alpha-bristles (outer of these hirsute and longer than inner bristle; inner bristle with short marginal spines), three beta-bristles (outer of these longer than others and strongly pectinate, middle bristle weakly pectinate, inner bristle bare), and stout bifurcate ventral tooth; end joint with four a-bristles (inner two of these longer than others and pectinate, inner of two outer bristles with few minute teeth, remaining bristle bare), and total of about 9 b-, c-, and d-bristles, some pectinate.

Fifth limb (Fig. 2b, c): Epipodial appendage with 55 bristles; distal anterior process of protopodite relatively small (Fig. 2c); endite I fragmented on specimen, endite II with 4 spinous bristles, endite III with 6 spinous bristles. Exopodite: anterior side of 1st joint with three bristles near inner margin, smaller of these with short marginal spines, middle bristle with long proximal hairs and short distal spines, remaining bristle with stiff proximal spines and distal teeth (tip of bristle knifelike); main tooth of 1st joint consisting of five pectinate teeth and proximal peg (Fig. 2b); one spinous bristle present on posterior side of joint proximal to peg; 2nd joint with one stout spinous anterior bristle near anterior process of protopodite, one spinous, proximal, posterior bristle, five pectinate a-bristles, and a total of about 7 b′- and b″-bristles; inner lobe of 3rd joint with short proximal bristle bearing long proximal and short distal hairs, and two longer terminal bristles with few short, faint, marginal hairs; outer lobe of 3rd joint hirsute, with two terminal bristles, both with long proximal and short distal hairs; 4th and 5th joints fused, hirsute; 4th joint with three bristles, posterior of these with short, stiff, marginal spines, remaining bristles with few short, faint hairs; 5th joint with two bristles, the posterior of these with short marginal spines, the other with a few faint hairs; small process with a few terminal spines present between 4th and 5th joints, at base of bristles of 5th joint.

Sixth limb (Fig. 2d): Three short bristles in place of epipodial appendage; endite I with two short medial bristles and one longer terminal bristle; endite II with three short proximal bristles and two longer terminal bristles; endite III with one or no medial bristles and three terminal bristles; endite IV with four terminal bristles; end joint with 11 anteroventral bristles (with long proximal and short distal spines) separated by short space from 3 plumose bristles (bristles about same length as anteroventral bristles); in addition, end joint with two short bristles with bases on lateral side near anterior corner of ventral margin (both bristles with short marginal spines); medial surface of endites II–IV and end joint hirsute; lateral edge of end joint with long spines.

Seventh limb (Fig. 2e): Ventral side with four proximal and ten distal bristles; dorsal side with 6–8 proximal and 8–9 distal bristles, each bristle with up to six bells; terminus with nine slender recurved teeth forming comb opposite one slender peg.

Furca (Fig. 2f): Right lamella with eight claws, left with seven, each claw separated from lamella by suture and with teeth along posterior margin; claws decrease in curvature posteriorly along lamella.

Rod-shaped organ: Short, finger-like, with rounded tip (Fig. 2g).

Eyes: Medial eye bare, lightly pigmented (Fig. 2g). Lateral eye absent.

Upper lip (Fig. 2h): Consisting of unpaired anterior part with terminal glandular field and a pair of long tusks; tusks with suture near middle and terminal field; part of tusks distal to suture at slight angle to part proximal to suture; posterior margin of tusks linear except near terminal end where a few minute glandular openings occur.

Posterior of body (Fig. 1i): Small bulge on postero-dorsal corner with tuft of long hairs.

Copulatory organ (Fig. 2i): Consisting of several lobes, some with minute bristles (examined only under low magnification, 20X objective).

COMPARISONS: The dorsal position of the caudal process on the posterior margin distinguishes the new species, *Metavargula bradfordae*, from previously described members of the genus.

Metavargula mazeri n.sp. (Figs 3–5, Plates 1–6)

HOLOTYPE: One female on three slides and in alcohol, in collection of the New Zealand Oceanographic Institute, type number H212.

TYPE-LOCALITY: NZOI Stn. G388, continental slope east of northern end of South Island, 43° 35′ S, 178° 03′ W, 384 m.

ETYMOLOGY: The species is named for Mr Paul Mazer, who assisted in preparing the illustrations for this paper.

DESCRIPTION OF FEMALE, PROBABLY ADULT

Carapace: Oval in lateral view with small incisur and and prominent dorsally oriented posterior caudal process with open tip (Fig. 3a, Plates 1, 2a); valve surface finely reticulate (Plates 2a, c, 3a–c).

Pores: Pores that bear bristles consist of three types: noded and rimmed pores (Plate 3c–e), rimmed pores without node (Plate 2b, e, f), and simple pores (Plate 2b, d). Pores without bristles consist of both simple and rimmed types (Plate 3f). Some bristles have branches (Plate 2d), and some have a pore near the base (Plate 2e, f).

Infold: Rostral infold with 38 bristles forming row (Plate 5f) and 1 additional bristle posterior to row, near middle of infold; anteroventral, ventral, and posteroventral infolds with small bristles forming row (Fig. 3b, Plate 5d, e); list anterior to caudal process forming distinct ridge with few small bristles medially and about 14 minute processes along posterior edge (Plates 4c, 5a, b); infold of caudal process with minute pores (Plates 4c, f, 5c); knob present on anterior edge of caudal ridge near dorsal end (Fig. 3c, d, Plate 4a, c, d); minute bristle present on anteroventral side of knob (Plate 4d, e).

Selvage: Wide lamellar prolongation present in vicinity of incisur and along anterior margin, narrower along ventral margin, outer margin minutely digitate (Plates 1f, 2a, 4a, b, 5d, 6).

Size: Holotype, length 4.34 mm, height 3.49 mm.

First antenna (Fig. 4a–c): First and 2nd joints bare; 3rd joint with two spinous bristles, one dorsal, one ventral; 4th joint with two spinous bristles, one dorsal, one ventral; sensory bristle of 5th joint with eight long, slender, proximal filaments, two slender and slightly shorter distal filaments, and bifurcate tip; bristle of 6th joint about one and one-half times length of joint, with faint short marginal spines. Seventh joint: a-bristle about two and one-half times length of bristle of 6th joint, with a few short, marginal spines; b-bristle

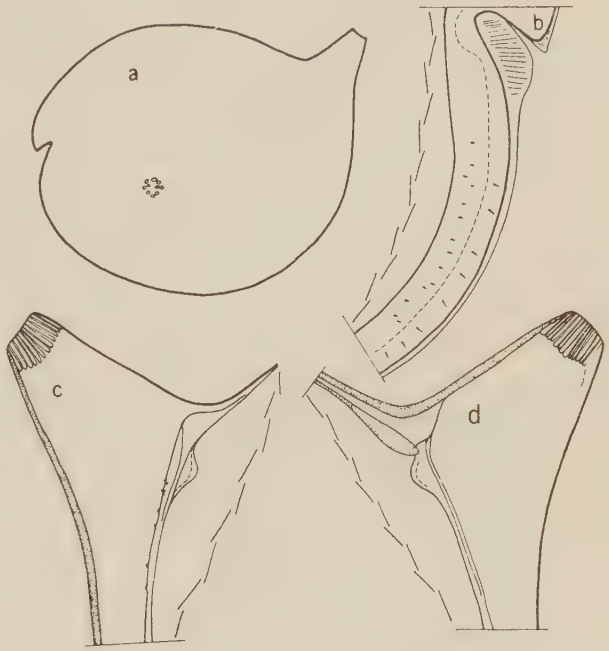

FIG. 3. *Metavargula mazeri* n.sp., holotype, female, probably adult, H212: *a*, outline of specimen, length 4.34 mm; *b*, anterior of left valve, medial view; *c,d*, caudal processes of left and right valves, medial views.

broken, stump about one and one-half times length of a-bristle, with four filaments bearing few marginal teeth; c-bristle about twice length of sensory bristle of 5th joint, with eight marginal filaments (some with teeth), and bifurcate tip. Eighth joint: d- and e-bristles bare, about two-thirds length of sensory bristle; f-bristle broken, stump reaching tip of sensory bristle, with eight filaments, some with minute teeth; g-bristle same length as c-bristle, with nine marginal filaments (some with marginal teeth), and bifurcate tip.

Second antenna (Fig. 4d–f): Protopodite with small distomedial bristle (Fig. 4d). Endopodite 2-jointed (Fig. 4d), 1st joint with three short, bare, proximal bristles and one long, spinous, distal bristle; 2nd joint

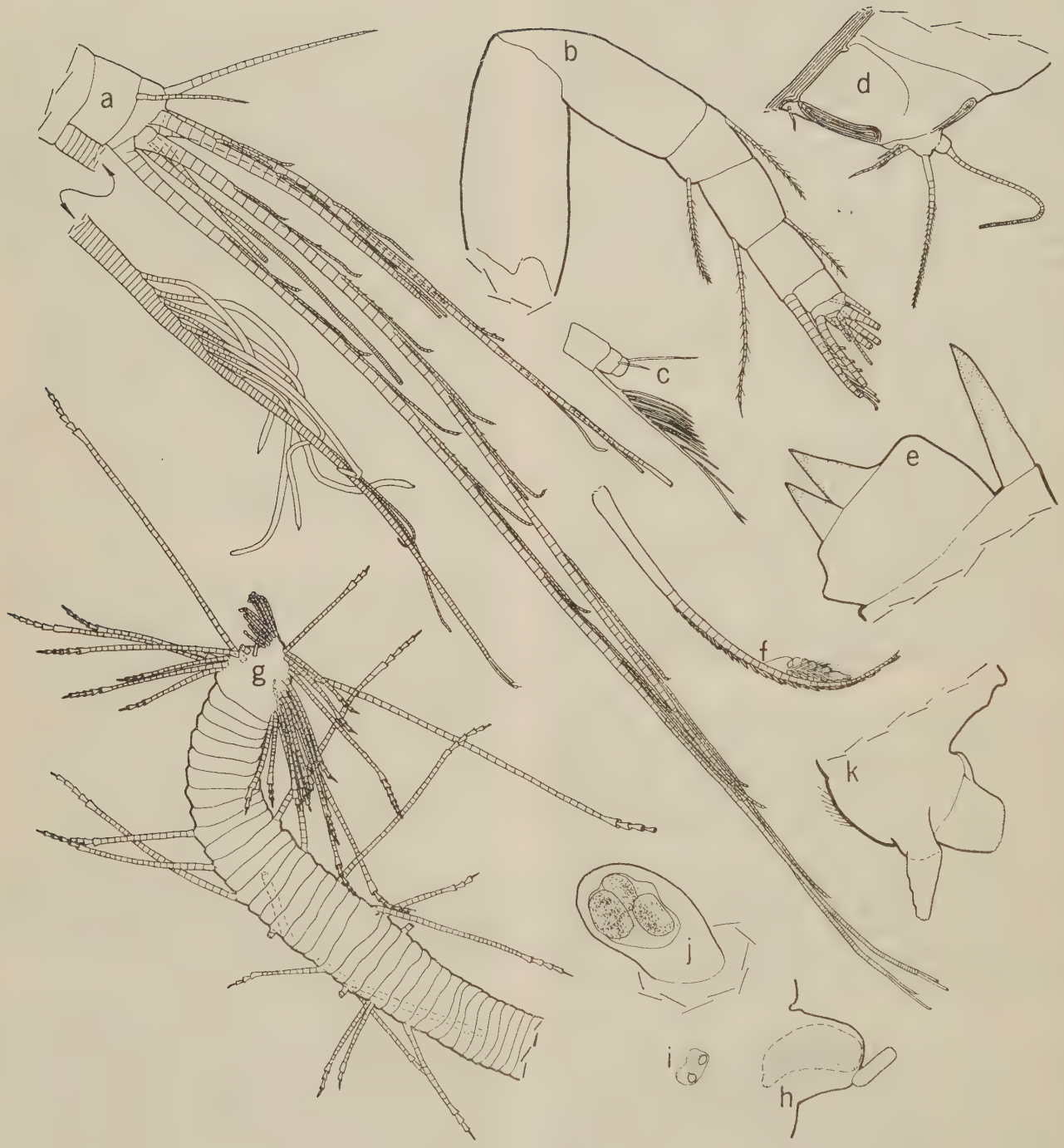

FIG. 4. *Metavargula mazeri* n.sp., holotype, female, probably adult, H212: *a*, tip of left 1st antenna, medial view; *b*, right 1st antenna, lateral view (ends of bristles of end joints not drawn); *c*, tip of left 1st antenna showing bristle of 6th joint, a-bristle of 7th joint, and idealized sensory bristle of 5th joint; *d*, endopodite and distal end of protopodite of right 2nd antenna, medial view; *e*, 8th and 9th joints of exopodite of right 2nd antenna, medial view (bristles not shown); *f*, bristle of 2nd joint of exopodite of right 2nd antenna, medial view, note parasite attached to bristle; *g*, 7th limb; *h*, medial eye and rod-shaped organ; *i*, left lateral eye; *j*, right lateral eye drawn under cover slip; *k*, upper lip, anterior to right.

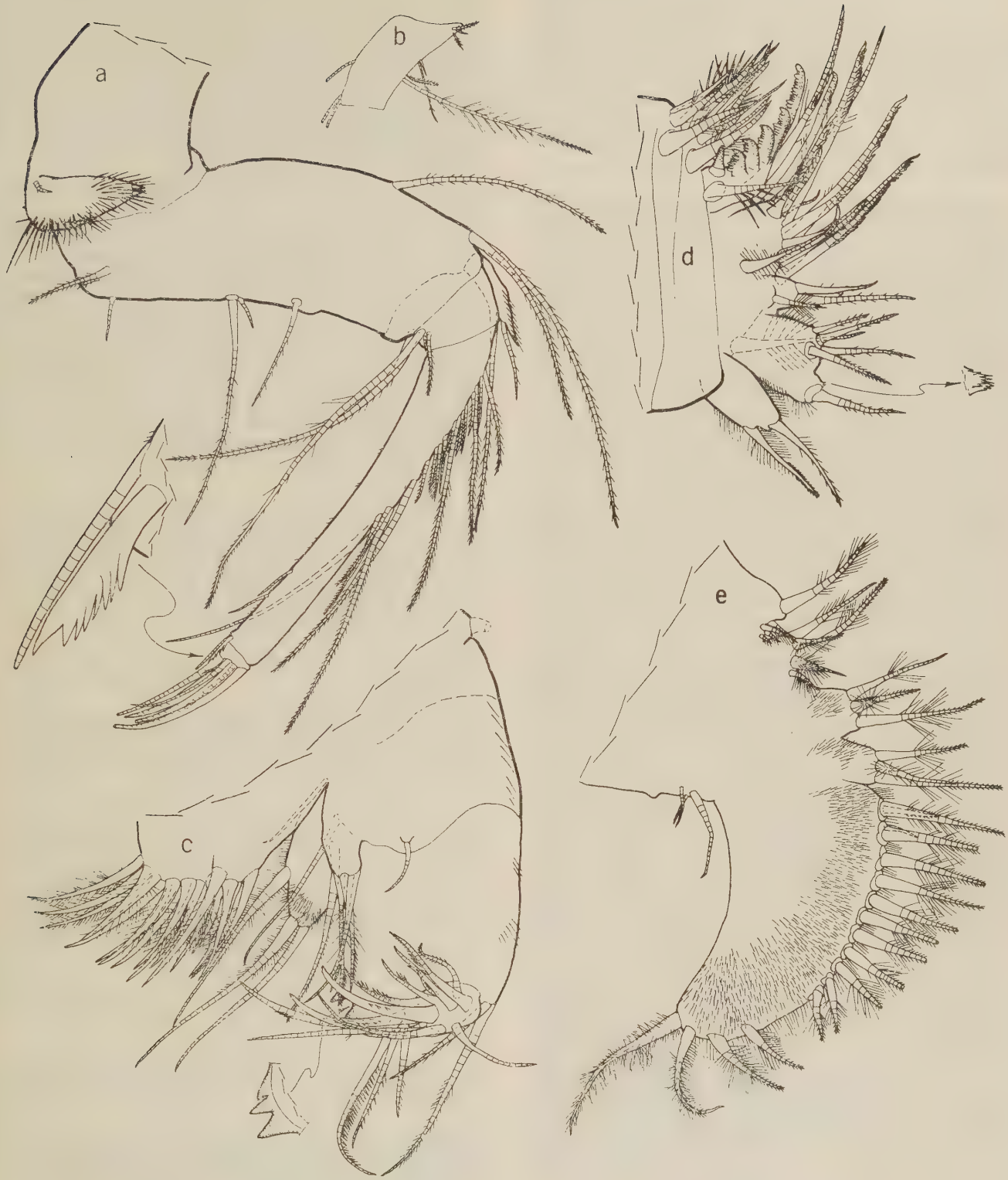

FIG. 5. *Metavargula mazeri* n.sp., holotype, female, probably adult, H212: *a*, left mandible, medial view; *b*, basale of right mandible, medial view; *c*, left maxilla, medial view; *d*, distal end of left 5th limb, posterior view; e, left 6th limb, medial view.

short with long, bare terminal bristle. Exopodite: bristle of 2nd joint with about 43 stout ventral spines including very large subterminal spine (Fig. 4f); bristles of joints 3–8 with natatory hairs, no spines; 9th joint with four bristles with natatory hairs; joints 3–8 with stout basal spines; basal spine of 8th joint slightly longer than 9th joint on right limb (Fig. 4e), much longer on left limb; two stout lateral spines on 9th joint; joints 2–8 with minute spines forming row along distal margin.

Mandible (Fig. 5a, b): Coxale endite with abundant slender spines and two stout terminal spines; minute tubular bristle with few marginal spines present at base of endite. Basale: dorsal margin with one spinous bristle distal to middle and two spinous terminal bristles; ventral margin of left limb aberrant (Fig. 5a), with two medial a-bristles, one short b-bristle, two c-bristles (one long, one short), and one d-bristle (none of the bristles with wreaths of long spines or hairs); right limb with three a-bristles, no b-bristles, two c-bristles, and two d-bristles (one d-bristle with wreaths of long spines) (Fig. 5b), Exopodite: hirsute, with two bristles, distal of these about one-third length of proximal bristle. Endopodite: 1st joint with four ventral bristles; two long, one short, one minute; ventral margin of 2nd joint with bristles forming three groups of one, one, and two bristles; medial bristle of distal group broad, with stout marginal teeth along dorsal margin and with knifelike tip; dorsal margin of 2nd joint with about 18 bristles proximally; end joint with three stout claws and four bristles.

Maxilla (Fig. 5c): Precoxale with fringe of dorsal hairs; coxale with stout, hirsute, dorsal bristle; endite I with about 13 spinous bristles; endites II and III each with five spinous bristles; basale with one bristle near base of endite II and two bristles near distal margin. Exopodite large, with three bristles, proximal of these and inner of two terminal bristles with long proximal hairs, outer terminal bristle bare. Endopodite: 1st joint with two alpha-bristles (outer of these hirsute and longer than inner bristle, inner bristle with short marginal spines), three beta-bristles (outer of these longer than others and strongly pectinate, middle bristle weakly pectinate, inner bristle with faint marginal spines), and stout ventral tooth with three prongs; end joint with pectinate and spinous bristles.

Fifth limb (Fig. 5d): Endites I and II with four spinous bristles; endite III with six spinous bristles; distal anterior process of protopodite not observed, but could be present. Exopodite: main tooth of 1st joint consisting of five pectinate teeth and proximal peg with few minute spines; one bristle with four long, proximal hairs present proximal to peg; anterior bristles of 1st joint not visible on specimen because of orientation of mounted limb; 2nd joint with spinous proximal bristle on posterior side, one proximal bristle on anterior side, four pectinate a-bristles, and total of six b′- and b″-bristles; inner lobe of 3rd joint with short proximal bristle bearing long proximal and short distal hairs, and two longer terminal bristles with few short spines; outer lobe of 3rd joint hirsute, with two terminal bristles (outer of these with abundant long, proximal hairs and short, distal spines, inner bristle with few long, proximal hairs and short, distal hairs); 4th and 5th joints fused, hirsute; 4th joint with four bristles, posterior of these with short, stiff, marginal spines, remaining bristles with few short spines; 5th joint with one bristle bearing a few short, faint hairs (one bristle may be missing); small process with few terminal spines present between 4th and 5th joints, at base of bristle of 5th joint.

Sixth limb (Fig. 5e): Three short bristles in place of epipodial appendage; endite I with four short, medial bristles and one longer terminal bristle; endite II with three short, proximal bristles and two longer, terminal bristles; endites III and IV with no medial bristles and three terminal bristles; end joint with 10 or 11 antero-ventral bristles (with long proximal and short distal spines) separated by short space from 2 spinous and 2 plumose bristles (posterior of these longer than other bristles of end joint); in addition, end joint with one or two short bristles with bases on lateral side near anterior corner of ventral margin (both bristles with short marginal spines); medial surface of limb hirsute; lateral edge of end joint with long spines.

Seventh limb (Fig. 4g): Ventral side with 6–7 proximal and 14–16 distal bristles; dorsal side with 11–12 proximal and 8–10 distal bristles, each bristle with up to six bells; terminus with 11 slender recurved teeth forming comb opposite one slender peg.

Furca: Fragmented on specimen.

Rod-shaped organ: Short, finger-like, with rounded tip (Fig. 4h).

Eyes: Medial eye bare, pearly in reflected light, appearing light brown in transmitted light (Fig. 4h). Lateral eye small, with two or three ommatidia (Fig. 4i, j).

Upper lip (Fig. 4k): Consisting of unpaired anterior part with terminal glandular field and a pair of long tusks; each tusk with medial suture proximal to middle; tusks distal to suture at slight angle to part proximal to suture; posterior margin of tusks with projecting glandular opening giving step-like appearance to margin; tip of tusks with glandular openings; lip posterior to tusks hirsute.

Posterior of body: Specimen torn in vicinity of small bulge with tuft of long hairs observed on *M. bradfordae*.

Eggs: Holotype with unextruded eggs (maximum length of one egg 0.43 mm.)

Parasites: Left 6th limb and exopodite of right 2nd antenna (Fig. 4f) each with two juvenile parasitic crustacea. In addition, crustacea are represented by attached head regions only on the exopodite of the right 2nd antenna (three specimens), exopodite of left 2nd antenna (one specimen), left mandible (one specimen), right mandible (one specimen), and left 1st antenna (one specimen). The crustaceans are attached at their

anterior region to either a bristle or the stem of a limb of the ostracod. At the place of attachment the ostracod part is brown, apparently as a result of crustacean activity within the ostracod. The crustacean is a type not previously reported from Ostracoda. It has been sent to Dr Janet Bradford for study.

COMPARISONS: In lateral view the carapace of the new species, *Metavargula mazeri,* resembles that of *M. bradfordae,* but it is larger. *M. mazeri* also differs from *M. bradfordae* in having lateral eyes, and larger basal spines on the exopodite of the 2nd antenna.

Vargula Skogsberg, 1920

TYPE-SPECIES: *Cypridina (Vargula) norvegica* Baird, 1860.

DISTRIBUTION: This genus is widespread; its range extends from about 80°N to 74°S. The species in the vicinity of New Zealand were collected in a depth range of 117–300 m.

Vargula was represented in the collections by one species, *Vargula ascensus,* n.sp. Kornicker (1975a: 193) previously described *Vargula stathme* from Cook Strait at a depth of 117 m.

Key to Species in the Vicinity of New Zealand

Maximum length of lateral eye slightly longer than rod-shaped organ; posterior edge of tusks on upper lip fairly linear ..... *V. stathme* Kornicker, 1975
Maximum length of lateral eye one-half length of rod-shaped organ; posterior edge of tusks steplike ..... *V. ascensus* n.sp.

Vargula ascensus n.sp. (Figs. 6–8a)

HOLOTYPE: Ovigerous female on slides and in alcohol in collection of the New Zealand Oceanographic Institute, DSIR, Wellington, New Zealand, type number H215.

PARATYPE: USNM 156982, one juvenile from same sample as holotype.

TYPE-LOCALITY: NZOI Stn A910, east of South Island, New Zealand, 43° 04′S, 178° 39′W, 549 m.

ETYMOLOGY: Specific name from the Latin "ascensus" meaning step refers to the step-like profile of the posterior margin of the tusks on the upper lip of the species.

DESCRIPTION OF ADULT FEMALE

Carapace: Oval in lateral view with deep incisur and narrow caudal process (Fig. 6a); ventral and dorsal margins slightly convex.

Infold: Infold behind rostrum with 15 or 16 bristles (Fig. 6b); two pairs of bristles present at inner end of incisur, one pair lateral to selvage, one pair medial to selvage; infold extending from incisur to middle of ventral margin with 39 or 40 double bristles; infold from middle of ventral margin to anterior end of caudal process with three double bristles; list in front of caudal process broad with minute processes along dorsal margin, but appearing smooth at low magnification, and with about 17 minute medial bristles (Fig. 6c).

Selvage: Lamellar prolongation with smooth outer margin present along anterior and ventral margins, broad along inner margin of incisur, narrower elsewhere.

Central adductor muscle attachment scars: Consisting of about 13 small closely spaced oval scars (Fig. 6a).

Size: Holotype, length 2.64 mm, height 1.71 mm.

First antenna (Fig. 6d): First joint bare; 2nd joint with spines along dorsal margin and on medial surface; 3rd joint short with two spinous bristles, one dorsal (proximal to middle) reaching just past middle of 4th joint, one ventral (terminal) almost reaching end of 4th joint; 4th joint long with two spinous, terminal bristles, one ventral, one dorsal (dorsal bristle slightly longer than ventral and reaching end of 5th joint); sensory bristle of long 5th joint with 12 marginal filaments (some with a few minute teeth) and bifurcate tip; medial bristle of 6th joint spinous, about one and one-half times length of 6th joint. Seventh joint: a-bristle slightly longer than bristle of 6th joint, with a few marginal spines; b-bristle about one and one-third times length of a-bristle, with three short filaments near middle and two minute distal spines, tip may be bifurcate; c-bristle reaching well past sensory bristle of 5th joint, with eight marginal filaments, some with a few teeth, and bifurcate tip. Eighth joint: d- and e-bristles bare, about two-thirds length of sensory bristle and about one-half length of c-bristle; f-bristle slightly shorter than c-bristle, with ten marginal filaments (some with a few minute teeth) and bifurcate tip; g-bristle same length as c-bristle, with 10 or 11 marginal filaments (some with minute marginal spines) and bifurcate tip.

Second antenna: Protopodite with short spinous medial bristle. Endopodite 3-jointed (Fig. 6e): 1st joint with five bristles, four bare, proximal (one longer than others), one spinous, distal, about same length as longest proximal bristle; 2nd joint elongate with short terminal bristle not reaching end of 3rd joint; 3rd joint elongate with long terminal bristle about twice length of combined joints 1–3. Exopodite: 1st joint with spines along dorsal margin; bristle of 2nd joint reaching 8th exopodial joint, with 9–10 stout ventral spines and 0–2 faint dorsal spines (Fig. 6f); bristles of joints 3–8 long, with natatory hairs, no spines; 9th joint with three long bristles with natatory hairs and one short dorsal bristle with a few short hairs; joints 3–8 with basal spines increasing in length on distal joints; basal spine on 8th joint reaching past distal end of 9th joint; lateral spine on 9th joint about one and one-half times length of 9th joint; joints 2–8 with short spines forming row along distal margin.

Mandible (Fig 6g): Coxale endite spinous with two stout terminal spines having minute marginal spines; short truncate process with minute terminal nipple present between the two terminal spines; minute bristle

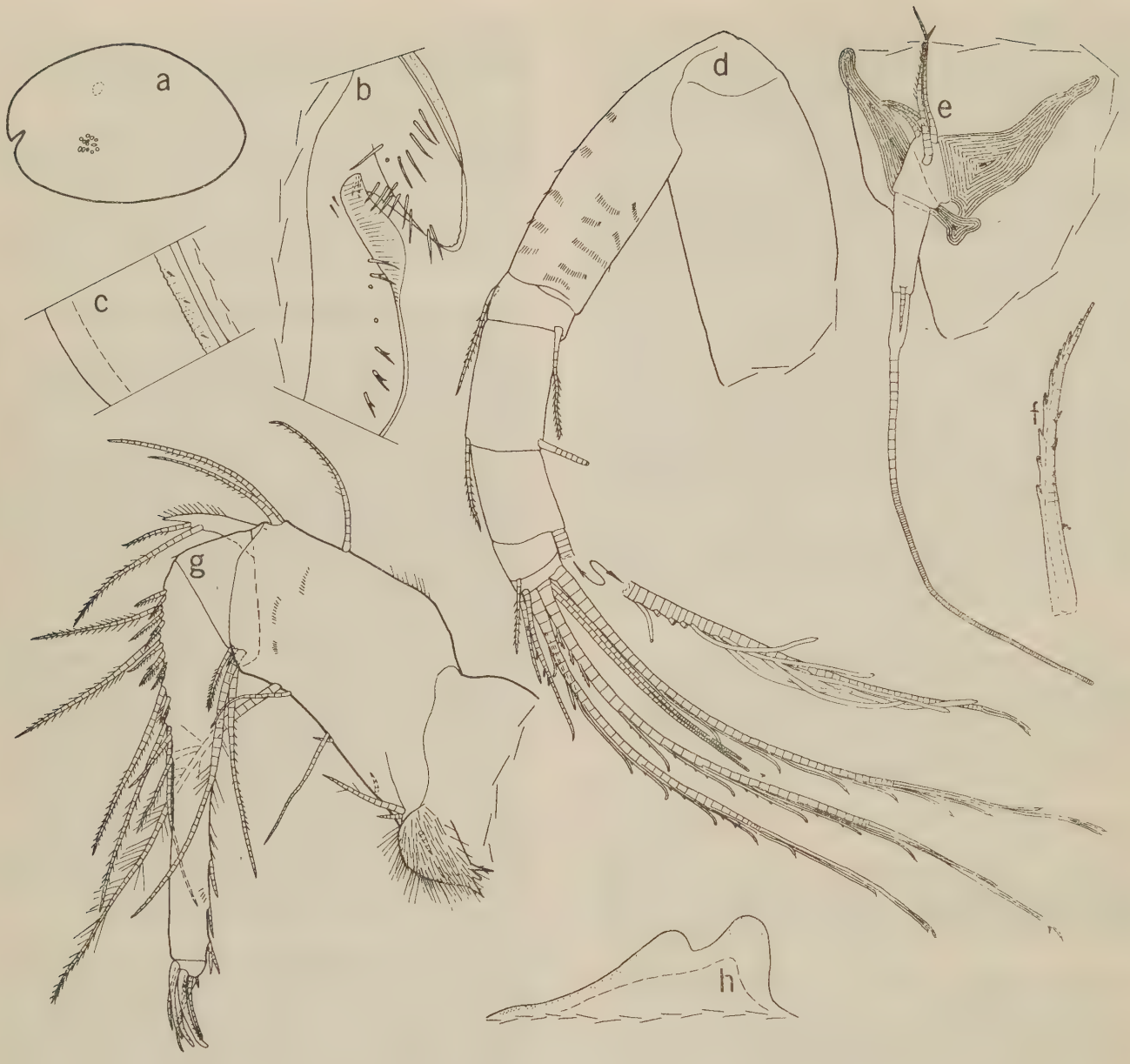

FIG. 6. *Vargula ascensus* n.sp., holotype, adult female, H215: *a*, outline of carapace, length 2.64 mm; *b*, anterior of left valve, medial view; *c*, section through narrow caudal process of left valve, medial view; *d*, right 1st antenna, medial view; *e*, endopodite and distal part of protopodite of right 2nd antenna, medial view; *f*, bristle of 2nd joint of exopodite of 2nd antenna; *g*, right mandible, medial view; *h*, distal tooth on inner margin of 1st joint of endopodite of right maxilla, medial view.

present near base of endite. Basale: ventral margin with two a-bristles, one short b-bristle, two c-bristles (one short, one medium), two d-bristles (one medium, one long); dorsal margin with proximal spines, one bristle distal to middle, and two terminal bristles; medial surface with short, faint spines forming rows. Endopodite: dorsal margin of 1st joint with a few terminal spines; ventral margin with four bristles, two long, one short, one minute; ventral margin of 2nd joint with proximal spines and four distal bristles forming three groups of one, one, and two bristles; medial bristle of distal group not annulate, knife-like, about same length as annulate medial bristle but broader; dorsal margin of 2nd joint with 11 short cleaning bristles with long, fine, marginal spines, and seven longer bristles with short marginal spines; end joint with three short claws having a few proximal ventral teeth, and four bristles: ventral bristle minute, lateral bristle near ventral end of joint with fairly broad proximal part, some bristles of end joint with a few spines, others bare. Exopodite hir-

FIG. 7. *Vargula ascensus* n.sp., holotype, adult female, H215: *a*, distal end of left 5th limb, posterior view; *b*, tooth on protopodite of right fifth limb, anterior view; *c*, left 6th limb, medial view; *d*, 7th limb; *e*, left lamella of furca, lateral view; *f*, left lateral eye, medial eye and rod-shaped organ; *g*, right genitalia, anterior to right; *h*, Y–Sclerite, anterior to left.

sute reaching distal end of 1st endopodite joint, with two spinous bristles, proximal of these twice length of distal bristle.

Maxilla: Endite I with ten spinous bristles with long spines; endite II with five bristles with long spines; endite III with six bristles with long marginal spines and one bristle with short marginal spines; dorsal margin of coxale with stout hirsute bristle. Basale with two distal bristles, both near ventral corner, medial of these short, bare, lateral of these long, spinous. Exopodite well developed, with one hirsute proximal bristle and two terminal bristles (bristle closest to proximal bristle hirsute, other bristle with short marginal spines). Endopodite: 1st joint with bilobate cutting tooth (Fig. 6h), two alpha-bristles (longer of these hirsute, other with short marginal spines), and three beta-bristles (one short, bare, one short, pectinate distally, one long, stoutly pectinate); end joint with four a-bristles (bare or with minute teeth), and about nine b- to d-bristles, many strongly pectinate.

Fifth limb: Distal anterior process of protopodite large with irregular outline (Fig. 7b); three endites present, all with spinous or pectinate bristles (Fig. 7a). Exopodite: main tooth of 1st joint consisting of six pectinate teeth and one smooth proximal tooth (Fig. 7a); a single bristle with five long, proximal hairs present proximal to smooth tooth; distal anterior margin of 1st joint with three stout bristles, all with long proximal hairs (inner bristle pectinate distally, other bristles with short spines distally); posterior side of 2nd joint with long proximal bristle bearing long proximal and shorter distal hairs; 2nd joint with total of about 12 a- and b-bristles; inner lobe of 3rd joint with two terminal bristles with short marginal spines and one shorter, proximal, posterior bristle with long proximal hairs and short distal spines (the latter bristle could be on distal margin of 2nd exopodite joint); outer lobe of 3rd joint with two terminal bristles, outer of these with long proximal hairs and short distal spines, inner bristle with short marginal spines; 4th joint with four bristles with short marginal spines; 5th joint separated from 4th by suture, with two terminal bristles with short marginal spines; a small hirsute process present on inner edge of terminal margin of 5th joint; 3rd, 4th and 5th joints hirsute.

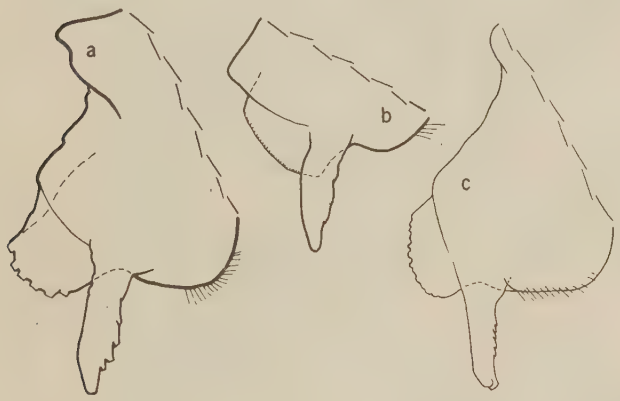

FIG. 8. *Vargula ascensus* n.sp., holotype, adult female, H215: *a*, upper lip, anterior to left. *Vargula antarctica* (Müller, 1908), juvenile male from Weddell Sea, USNM 126218 (*see* Kornicker, 1975a:155), length 2.33 mm: *b*, upper lip, anterior to left. *Vargula antarctica* (Müller), adult female from McMurdo Sound (*see* Raymond and DeVries, 1976, table 1, p. 600), USNM 156985: *c*, upper lip, anterior to left.

Sixth limb (Fig. 7c): Four or five short, bare bristles in place of epipodial appendage; endite I with three bristles, one terminal, two short medial, both with long marginal spines; endite II with five bristles, three short, proximal medial, with long spines, two long, terminal, with long proximal and short distal spines; endite III with four bristles, one medial, three terminal, all with long proximal and short distal spines; endite IV with three bristles, one medial, two terminal, all with long proximal and short distal spines; end joint with seven anterior bristles with long proximal and short distal spines separated by space from three long, stout, hirsute, posterior bristles; medial surface of endites III and IV and end joint hirsute; lateral surface of end joint with stiff spines along ventral margin.

Seventh limb (Fig. 7d): Ventral margin with seven terminal bristles and five or six more proximally located bristles; dorsal margin with six terminal bristles and six proximal bristles; each bristle with up to six bells; terminal comb with 15 teeth: 7 long, recurved midteeth; 8 short, truncate, lateral teeth, 4 on each side; one slender peg with slightly bulbous tip opposite comb.

Furca (Fig. 7e): Each lamella with nine claws; claws 2 and 4 united to lamella, remaining claws separated from lamella by suture; each claw with teeth along posterior margin; 3rd claw very slightly narrower at base than 4th claw.

Rod-shaped organ: Short, finger-like (Fig. 7f).

Eyes: Medial eye bare, pigmented (Fig. 7f). Lateral eye small, pigmented, maximum length about one-half diameter of medial eye, with four ommatidia (two ventral ommatidia larger than dorsal ommatidia) (Fig. 7f).

Upper lip (Fig. 8a): Anterior undivided part with terminal glandular field with fairly large glandular openings; posterior pair of tusks with steplike posterior margin formed by projecting glandular processes; rounded lobe posterior to tusks hirsute.

Posterior of body: Smoothly rounded without hairs, spines or dorsal process.

Genitalia: Oval with attached ?spermatophore (Fig. 7g).

Y-Sclerite: Typical for genus (Fig. 7h).

Eggs: Holotype with 24 eggs.

COMPARISIONS: The new species, *Vargula ascensus*, is closely related to *V. antarctica* (Müller, 1908), but is separated from it because of the steplike profile of the posterior margin of the tusks on the upper lip formed by projecting glandular processes (Fig. 8a). The glandular processes form relatively small steps on the upper lip of *V. antarctica* (Fig. 8b, c). The length of the carapace of the unique female holotype of *V. ascensus* is 2.64 mm. The range of lengths of adult females of *V. antarctica* is 3.63–3.9 mm (Kornicker 1975a: 156). An exception is a length of 3.00 mm for an ovigerous female from off the south-east coast of Australia reported by Poulsen (1962: 182). Kornicker 1975a: 155) questioned Poulsen's identification because of its small size. I have not examined Poulsen's specimens. Possibly, they are conspecific with *V. ascensus*, but the 5th limb illustrated by Poulsen (1962: 182: fig. 91), unlike that of *V. ascensus*, does not have a suture between the 4th and 5th exopodial joints.

Cypridinodes Brady, 1902

TYPE-SPECIES: *Cypridinodes favus* Brady, 1902.

DISTRIBUTION: This genus is found in the Indo-West Pacific region. It has been collected in the vicinity of

New Zealand only in the Tasman Sea at depths of 384–610 m.

Cypridinodes was represented in the collections by one species, *Cypridinodes concentrica* n.sp. Poulsen (1962: 287) previously described *Cypridinodes reticulata* from the Tasman Sea west of the northern tip of South Island at a depth of 610 m.

Key to Species in the Vicinity of New Zealand

Carapace with ridge along posterodorsal margin ..... *C. reticulata* Poulsen, 1962
Carapace with concentric ridge (missing in anterior part of valve) near outer edge ..... *C. concentrica* n.sp.

Cypridinodes concentrica n.sp. (Fig. 9, Plates 7–13)

HOLOTYPE: Ovigerous female in alcohol, in collection of the New Zealand Oceanographic Institute, DSIR, Wellington, New Zealand, type number H214.

TYPE-LOCALITY: NZOI Stn G388, continental slope north-west of Chatham Islands, 43° 35′ S, 178° 03′ W, 384 m.

ETYMOLOGY: The specific name, from the Medieval Latin "concentricum" meaning having a centre in common, as circles, refers to the peripheral ridge on the carapace of this species.

PARATYPES: One adult female without eggs (USNM 156752) and two ovigerous females (USNM 156665, 156753) from same sample as holotype.

DESCRIPTION OF FEMALE

Carapace: Oval in lateral view with incisur and small caudal process (Plates 7, 8a, b); anterior margin of rostrum evenly rounded; inferior corner of rostrum forming right-angle except for minute protuberance at tip (Plate 8a, b); tip of caudal process truncate.

Ornamentation: A low concentric ridge present within valve margins except on anterior part of valves (Fig. 9a; Plate 7a–e); ridge more prominent along posterodorsal part of valve than elsewhere. Surface with large dish-like fossae; fossae without rims, sides sloping gently to node at bottom (Plates 8e; 9a).

Pores: Middle of small pits (scattered over valve surface) with single minute process bearing pore (Plate 8c, d), or more complex bifurcate process with a terminal pore at tip of each branch (Plate 9b–d); a small tubular pore present near base of bifurcate process (Plate 9b). Short bristles sparsely distributed over valve surface emerge from rimmed pores with node (Plate 9e, f) or without node (Plate 8f). Surface of valves with faint reticulations more evident in vicinity of incisur (Plate 8a–d). A pair of bristles present at inner end of incisur.

Infold: Rostral infold with outer row of about 32 bristles and inner row of about 11 bristles (Plate 11a); anteroventral infold and anterior half of ventral margin with about 136 short bristles forming row along list (Plate 11b); anteroventral infold proximal to list with about 14 long bristles; 2 short bristles present on infold just posterior to incisur; infold along posterior half of ventral margin with about 25 minute bristles; infold of caudal process forming pocket with anterior edge bearing about 40 digitate tubular processes (Plate 10a–e); individual minute tubular processes present lateral to, and between, digitate processes (Plate 10c, d, f).

Central adductor muscles: Individual oval muscles appearing sponge-like in cross-section (Plate 11c).

Valve struts: Stout struts present between shell and vestment (Plate 11d).

Size: Holotype, length 4.75 mm, height 3.60 mm; USNM 156665, length 4.82 mm, height 3.66 mm; USNM 156752, length 4.74 mm, height 3.38 mm; USNM 156753, length 4.84 mm, height 3.53 mm.

First antenna (Fig. 9b): 1st joint with faint medial spines; 2nd joint with medial and dorsal spines; 3rd joint short with proximal dorsal bristle and ventral bristle with base on medial side some distance from ventral margin; 4th joint long with two terminal bristles, one ventral, one dorsal; sensory bristle of 5th joint with nine long proximal filaments, three shorter distal filaments, and bifurcate tip; medial bristle of 6th joint with base near dorsal margin, about one and one-fourth times length of 6th joint. Seventh joint: a-bristle about twice length of bristle of 6th joint; b-bristle about two-thirds length of sensory bristle, with two pectinate and two bare filaments; c-bristle about one and one-half times length of sensory bristle of 5th joint, with six proximal pectinate filaments, and three longer bare distal filaments. Eighth joint: d- and e-bristles bare, slightly shorter than b-bristle; f- and g-bristles same length as c-bristle and with more-or-less similar filaments.

Second antenna: Protopodite with short medial bristle (Fig. 9c). Endopodite 3-jointed (Fig. 9c): 1st joint with one long and three short proximal bristles and one long distal bristle; 2nd joint with one distal bristle; 3rd joint with one very long bristle. Exopodite: 1st joint with spines forming seven or more clusters along ventral margin; bristle of 2nd joint with 19 spines along ventral margin and 17 more-slender spines along dorsal margin; remaining bristles with natatory hairs but no spines; 9th joint with four bristles, all with natatory hairs; joints 3–8 with stout basal spines; basal spine of 8th joint not reaching distal margin of 9th joint; 9th joint with lateral spine (Fig. 9d); distal margins of joints 2–8 with minute teeth forming row.

Mandible (Fig. 9e): Distal pair of bristles on ventral margin of 2nd endopodial joint about equal in length and width; proximal part of ventral bristles of 3rd endopodial joint fairly stout; limb otherwise similar to that of *Cypridinodes reticulata* Poulsen, 1962.

Fifth and 6th limbs: Similar to those of *C. reticulata*, except 6th limb with seven bristles in place of epipodial appendage (always?).

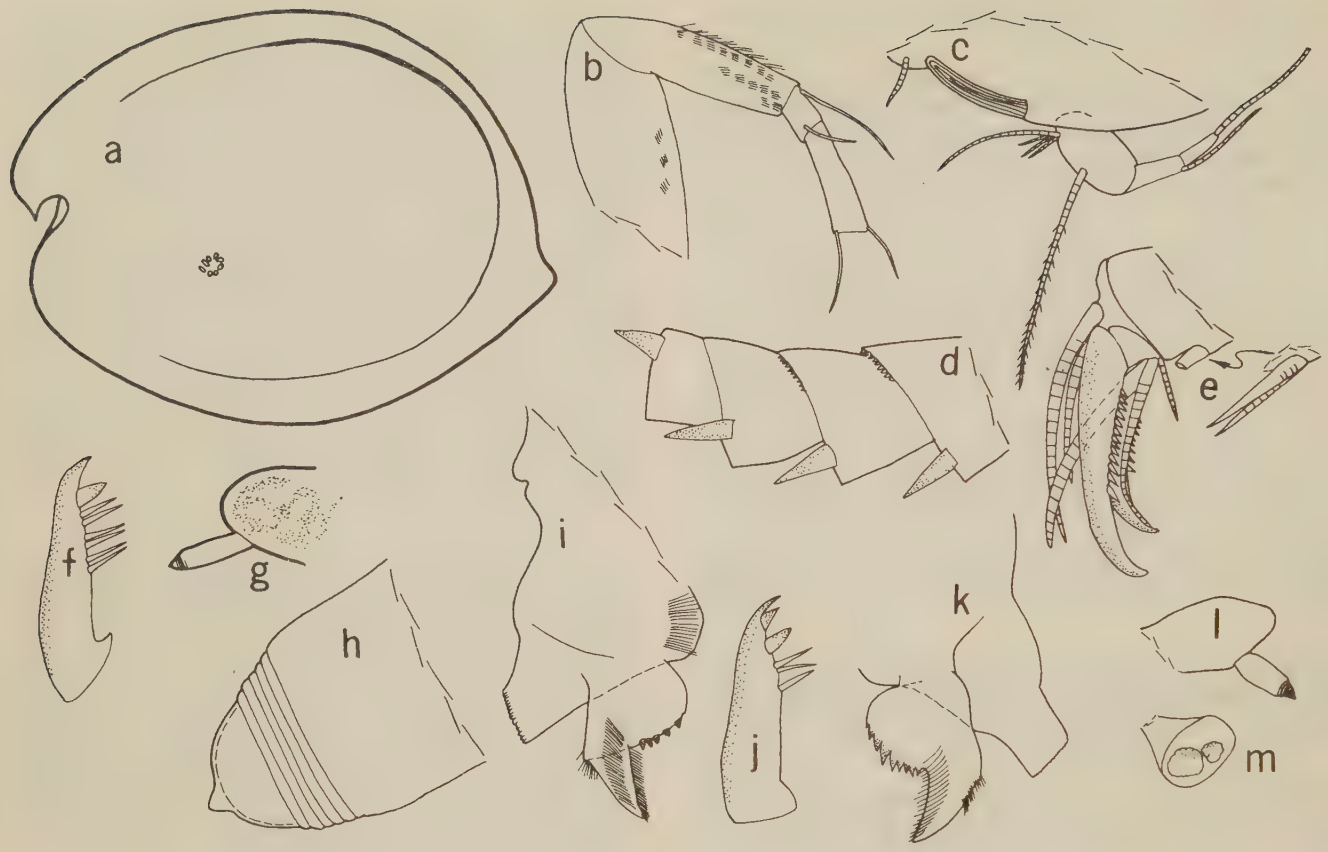

FIG. 9. *Cypridinodes concentrica* n.sp., paratype, adult female, USNM 156665: *a*, outline of left valve showing concentric ridge, length 4.82 mm; *b*, joints 1–4 of left 1st antenna, medial view; *c*, endopodite and distal part of protopodite of right 2nd antenna, medial view; *d*, joints 6–9 of exopodite of right 2nd antenna, lateral view; *e*, tip of right mandible, medial view; *f*, jaw opposite comb at tip of 7th limb; *g*, medial eye and rod-shaped organ; *h*, tip of rod-shaped organ shown in *g*; *i*, upper lip, anterior to left. *Cypridinodes concentrica* n.sp., paratype, adult female, USNM 156752, length 4.74 mm: *j*, jaw at tip of 7th limb; *k*, upper lip, anterior to right; *l*, medial eye and rod-shaped organ; *m*, right lateral eye, anterior to right, drawn at same magnification as *l*.

Seventh limb: Ventral side with 7–11 distal and 18–20 proximal bristles; dorsal side with 21–28 bristles; three lateral bristles (one or two on each side) present proximal to comb; bristles with up to six bells; comb with about 15 teeth: 9 middle teeth with rounded tips and marginal serrations; 3 end teeth on each side of middle teeth shorter than middle teeth and with flat tips and smooth sides; jaw opposite comb with 11–15 teeth along inner edge, proximal of these slender (Fig. 9f, j).

Furca and rod-shaped organ (Fig. 9g, h, l): Similar to those of *C. reticulata*.

Eyes: Lateral eye small, about two-thirds length of medial eye, consisting of sheath with two or more vague oval areas having light brown pigment (Fig. 9m). Medial eye bare, appearing pearly white in reflected light, light brown in transmitted light (Fig. 9g, l).

Upper lip (Fig. 9i, k, Plates 12, 13): With single anterior process with terminal glandular field and a pair of hirsute, pointed, posterior tusks; proximal part of each tusk with posterior lobe having 5–8 teeth along distal margin; portion of lobe following teeth rounded.

Encrustations: Anterior part of vestment inside shell of USNM 156665 with encrustation of unknown origin (Plate 11a, e, f).

COMPARISONS: This species is very close to *Cypridinodes reticulata* Poulsen, 1962, described by Poulsen (1962: 287) from *Galathea* Stn 626 in the Tasman Sea. It differs from that species in having lateral eyes (small), in having a larger carapace (length 4.74–4.84 mm compared to 4.1–4.2 mm for *C. reticulata*), and in having a concentric ridge (missing in anterior part of valve) near the outer edge of each valve. According to Poulsen's description, *C. reticulata* is

without lateral eyes. Poulsen did not describe or illustrate any ridges on the carapace of *C. reticulata*, but Kornicker (1975a: 96, fig. 38), who studied the valves of the types, observed a ridge along the posterodorsal margin. On all four specimens of *C. concentrica* in the present collection, the ridge continues along the posterior and ventral margins and along the dorsal margin.

Paracypridina Poulsen, 1962

TYPE-SPECIES: *Paracypridina aberrata* Poulsen, 1962, monotypy.

DISTRIBUTION: This genus is known only from four specimens of *P. aberrata* Poulsen, 1962, collected off Three Kings Islands. None were in the present collections.

Family PHILOMEDIDAE Müller, 1908

The family Philomedidae contains two subfamilies, Philomedinae Müller, 1908, and Pseudophilomedinae Kornicker, 1967 (*see* Kornicker, 1968). Only the former has been collected in the vicinity of New Zealand. None were in the present collections.

Subfamily PHILOMEDINAE Müller, 1908

Only two genera in this subfamily have been reported from the vicinity of New Zealand, *Scleroconcha* Skogsberg, 1920, and *Euphilomedes* Poulsen, 1962.

Key to Genera in the Vicinity of New Zealand

Carapace of female with longitudinal ribs (absent or reduced on male); rod-shaped organ with about 15 sutures ..... *Scleroconcha*

Carapace of female without longitudinal ribs; rod-shaped organ with not more than 1 suture in middle ..... *Euphilomedes*

Scleroconcha Skogsberg, 1920

TYPE-SPECIES: *Philomedes (Scleroconcha) appelloefi* Skogsberg, 1920.

DISTRIBUTION: This genus is widespread, with members ranging from Vancouver Island, Canada to the Weddell Sea, Antarctica. Previously recorded species from the vicinity of New Zealand are *Scleroconcha arcuata* Poulsen, 1962, *S. flexilis* (Brady, 1898), *S. sculpta* (Brady, 1898), and *S. wolffi* Kornicker, 1975.

Key to Species in the Vicinity of New Zealand

1 Carapace with branching bristles on lateral surface ..... *S. flexilis* (Brady, 1898)

Carapace with unbranching bristles on lateral surface 2

2 Carapace with 2 lateral midribs 3

Carapace without 2 lateral midribs ..... *S. wolffi* Kornicker, 1975

3 Furca of adult male with 10 claws ..... *S. sculpta* (Brady, 1898)

Furca of adult male with 12 claws ..... *S. arcuata* Poulsen, 1962

Euphilomedes Poulsen, 1962

TYPE-SPECIES: *Euphilomedes nodosa* Poulsen, 1962, by subsequent designation (Kornicker, 1967).

DISTRIBUTION: This genus is widely distributed with a northern limit of about 67°N and a southern limit of about 46°S. Males are often collected in surface plankton. Most species are found in shallow water. Previously recorded species from the vicinity of New Zealand are *Euphilomedes agilis* (Thomson, 1879) and *E. ferox* Poulsen, 1962.

Key to Species in the Vicinity of New Zealand

Exopodite of 5th limb of females and juvenile males with two large fanglike teeth on 1st joint and two prongs on proximal tooth of 2nd joint ..... *E. ferox* Poulsen, 1962

Exopodite of 5th limb of females and juvenile males with one large fanglike tooth on 1st joint and three prongs on proximal tooth of 2nd joint ..... *E. agilis* (Thomson, 1879)

Family CYLINDROLEBERIDIDAE Müller, 1906

The family Cylindroleberididae contains two subfamilies, Cylindroleberidinae Müller, 1906, and Cyclasteropinae Poulsen, 1965; both subfamilies have representatives in the vicinity of New Zealand, and were in the present collections.

Key to Subfamilies

(based on genera in the vicinity of New Zealand)

Carapace oval; 1st antenna with two or more dorsal bristles on 2nd joint ..... CYCLASTEROPINAE

Carapace usually elongate; 1st antenna with one dorsal bristle on 2nd joint ..... CYLINDROLEBERIDINAE

Subfamily CYCLASTEROPINAE Poulsen, 1965

The only genus of this subfamily found in the vicinity of New Zealand to date is *Cycloleberis* Skogsberg, 1920.

Cycloleberis Skogsberg, 1920

TYPE-SPECIES: *Cylindroleberis lobiancoi* G. W. Müller, 1894.

DISTRIBUTION: The genus *Cycloleberis* is widespread. The known limits of its range are 40° 50′ N in the Mediterranean Sea and 47°S in the vicinity of Stewart Island, New Zealand. Members of the genus are usually collected in waters shallower than 65 m, but Kornicker and Caraion (1974:5) reported two juveniles from a depth of 1100 m off Mauritania, Africa.

As discussed under the description of *Cycloleberis zealandica* (*see* p. 24), all five species of this genus that have been described from the vicinity of New Zealand are referred to *C. zealandica*.

Cycloleberis zealandica (Baird, 1850) (Figs 10–12, Plates 14–21)

Cypridina zealandica Baird, 1850b:102, pl. 17:figs 11–13; 1851:430,431; 1860:199. Brady, 1880:152. Skogsberg, 1920:439.

Cypridina zealanica Baird, 1850c:257, pl. 17:figs 11–13; 1852:58. Thomson, 1879:256.
Cypridina zealandica Baird. Grube, 1859:322; 1861:93.
Cyclasterope zealandica (Baird). Brady, 1898:433, pl. 43:figs 15–23. Müller, 1912:48,49.
Cyclasterope tenera Brady, 1898:433, pl. 44:figs 27–29. Müller, 1912:52.
Cyclasterope ovulum Brady, 1898:432, pl. 43:figs 24–30. Müller, 1912:48,49.
Cycloleberis zealandica (Baird). Skogsberg, 1920:442, Poulsen, 1965:281. Kornicker, 1975:569, fig. 351.
Cycloleberis tenera (Brady). Skogsberg, 1920:442. Poulsen, 1965:281.
Cycloleberis ovulum (Brady). Skogsberg, 1920:442. Poulsen, 1965:245,282. Kornicker, 1975:569,570.
Cyclasterope lobiancoi (Müller). Barney, 1921:179, fig. 2.
Cycloleberis bradyi Poulson [part], 1965:268, figs 90–92 [includes only holotype]. Kornicker, 1975:568.
Azygocypridina zealanica (Baird) [part], Eagar, 1971:60 [only Eagar's *Cypridina zealanica* included here].
Cycloberis lobiancoi (Müller). Eagar, 1971:61 [genus misspelled].
Cycloberis ovulum (Brady). Eagar, 1971:61 [genus misspelled].
Cycloberis tenera (Brady). Eagar, 1971:61 [genus misspelled].

HOLOTYPE: Not designated. Two syntypes are in the British Museum (Natural History), no. 1966.616.6 (one with valves intact, other with valves disarticulated).

SYNTYPE-LOCALITY: New Zealand (more specific locality unknown, *see* Kornicker, 1975a:569).

MATERIAL: Menzies Bay: USNM 156673, 1 juvenile female; 156965, 1 A-1 male; USNM 150299, 1 juvenile female; USNM 156966, 1 juvenile female; USNM 156744, 1 juvenile female; USNM 156969, 2 specimens. Bank off Stephens Island, Cook Strait: USNM 156968, 1 juvenile female. Shelf off south-eastern end of South Island: USNM 156973, 1 juvenile female; USNM 156974, 2 juveniles. Offshore from Marsden Power Station, Whangarei: USNM 156978, 1 juvenile from NZOI Stn J890; USNM 156975, 1 juvenile, and USNM 156976, 1 juvenile female, from NZOI Stn J891; USNM 156979, 1 juvenile from NZOI Stn J892; USNM 156977, 1 juvenile from NZOI Stn J896. Tasman Bay: USNM 156971, 1 juvenile from NZOI Stn K126; USNM 156970, 3 juveniles from NZOI Stn K142; USNM 156972, 1 juvenile from NZOI Stn K144; USNM 156672, 1 juvenile male from NZOI Stn K185; 1 juvenile from NZOI Stn K164 returned to the New Zealand Oceanographic Institute.

Baird (1850b:102) briefly described a species now known as *Cycloleberis zealandica* (Baird) from an unknown locality in the vicinity of New Zealand. Brady (1898:433) referred specimens collected in Lyttelton Harbour, New Zealand, to that species, and described a species now known as *Cycloleberis tenera* (Brady) from the same locality. Brady (1898:432) also described a species now known as *Cycloleberis ovulum* (Brady) from rock pools on Stewart Island, New Zealand. Poulsen (1965:268) described a species, *Cycloleberis bradyi* Poulsen, based on an adult male from Colville Channel, on the north-east coast of North Island, New Zealand, and two juvenile females, one from Moreton Bay, Australia, and the other from the Coral Sea, north-east of Australia. Barney (1921: 179) identified 21 specimens collected in Spirits Bay near North Cape as *Cyclasterope lobiancoi* (Müller) (= *Cycloleberis lobiancoi*).

A species of *Cycloleberis* in the present collections was widely distributed. It was collected from near the southern tip of South Island as well as from near the northern tip of North Island. It was also collected in Menzies Bay near Lyttelton Harbour where Brady (1898) had reported *C. zealandica* and *C. tenera*, and from fairly close to Colville Channel where Poulsen (1965) had reported *C. bradyi*. Unfortunately, the present collections consist of only juvenile males and females. Nevertheless, I have tentatively concluded that the five species of *Cycloleberis* that have been described from the vicinity of New Zealand are conspecific, and have referred them to *C. zealandica*. I exclude from this the two specimens from the vicinity of Australia that Poulsen (1965) referred to *C. bradyi*. These I believe to be an undescribed species. I base this belief on the length of the bristles on the 1st joint of the endopodite of the 2nd antennae of the two juvenile females referred to *C. bradyi* by Poulsen. Poulsen (1965:268) was justified in referring the adult male from Colville Channel to the new species *C. bradyi* because of the abundance of bristles (20) on the 2nd joint of the endopodite of the 2nd antennae (I have assumed that the presence of only 10 bristles on his illustration of the appendage, fig. 90d, is not meaningful). The endopodite of the 2nd antenna of the male *C. zealandica* illustrated by Brady (1898, plate 43:18) bears only seven bristles. With my interpretation it is necessary to assume wide variation in the number of bristles on the 2nd joint of the endopodite of the 2nd antenna. This problem should be resolved when additional adult males are collected and studied. The unusual square tip of the comb of the 5th limb of the male *C. bradyi* (*see* Poulsen, 1965, fig. 92a) may be useful in determining whether or not other males from New Zealand are conspecific with it.

DESCRIPTION OF FEMALE, A-1 INSTAR? (Figs 10–12a–c, Plates 14, 15)

Carapace: Oval in lateral view with dorsal margins evenly rounded on some specimens and slightly flattened on others (Figs 10a, 12a); incisur small with degree of overhang of rostrum differing from considerable on some specimens (Fig. 12a: USNM 156744) to almost none on others (Fig. 10a: USNM 156673).

Ornamentation: Anterodorsal margin of valve with unscalloped narrow rim continuing along ventral margin of rostrum; rim then curving anteriorly around inner end of incisur, paralleling anterior edge of valve below incisur and, finally, intersecting edge of anteroventral corner of valve (Fig. 10a; Plate 15a, b). Surface of valve with short ridges forming pattern on anterior and anteroventral parts of valve (Plates 14a, b, 15a, b). Shallow fossae with short bristle emerging from simple pore present posterior to each short ridge (Plate 14c, d, i); surface of fossae with minute reticulations (Plate 14f, j). Surface of valve between fossae with short bristles emerging from open pores with concentric rims (Plate 14c–e, g, h).

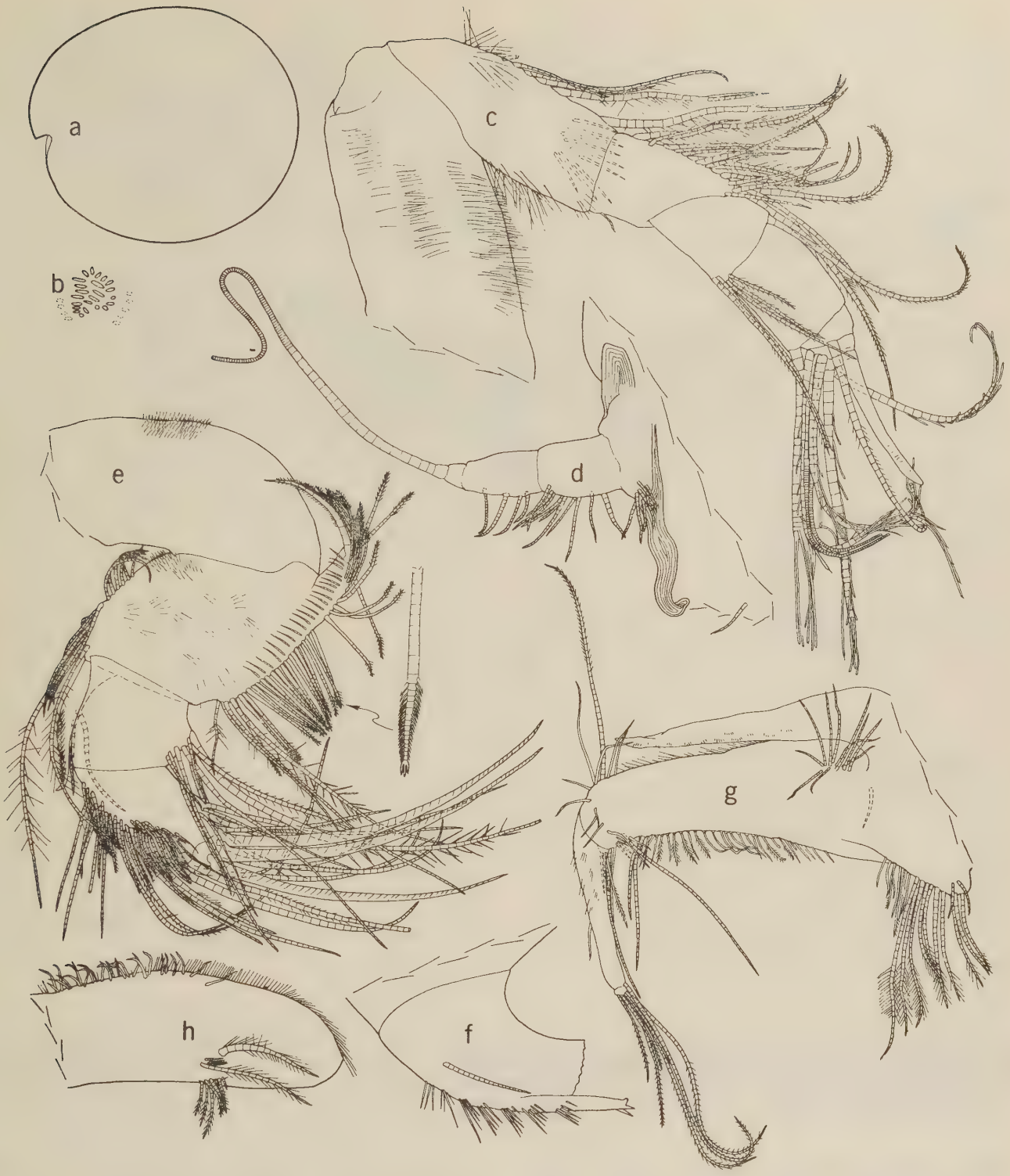

FIG. 10. *Cycloleberis zealandica* (Baird, 1850), juvenile female USNM 156673: *a*, outline of carapace, length 5.8 mm; *b*, sketch of central adductor muscle attachments as seen through right valve, lateral view, anterior to right; *c*, left 1st antenna, medial view; *d*, endopodite and distal part of protopodite of left 2nd antenna, medial view; *e*, right mandible, medial view; *f*, coxale endite of right mandible, medial view, dorsal branch missing; *g*, right maxilla, medial view; *h*, comb of right 5th limb, lateral view, ventral bristles not shown.

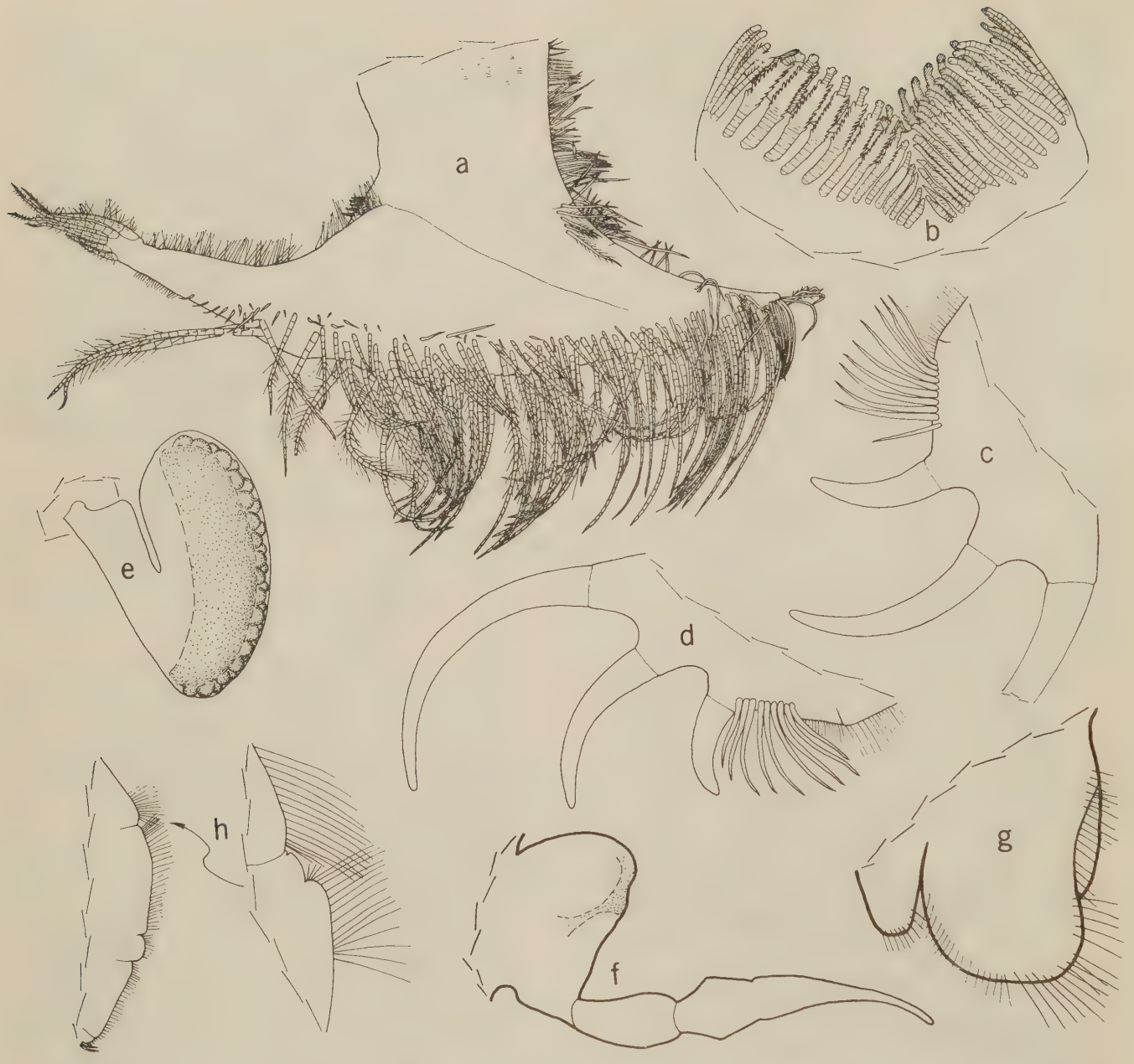

FIG. 11. *Cycloleberis zealandica* (Baird, 1850), juvenile female, USNM 156673: *a*, left 6th limb, medial view (not all bristles of anterior margin shown); *b*, tip of 7th limb (marginal teeth not shown); *c*, *d*, right and left lamellas of furca, lateral views (marginal teeth not shown); *e*, lateral eye, lateral view; *f*, medial eye and rod-shaped organ; *g*, upper lip, anterior to right; *h*, posterior of animal, anterior to left.

Infold: Rostral infold with numerous bristles (Plate 15d); anteroventral infold with numerous bristles between selvage and list (Plate 15e); list along anteroventral infold with lamellar prolongation (Plate 15e); ventral infold with numerous bristles forming row (Plate 15c). Posteroventral and posterior infold with bristles of varying types (Plate 15f–l): long bristles with pores at base (Plate 15i, l), long bristles emerging from open pore (Plate 15i), short bristles emerging from open pores (Plate 15h, j), and short tubular processes (Plate 15k). Posterior edge of valve just within selvage with medium bristles emerging from open pores (Plate 15f, g).

Selvage: Lamellar prolongation with serrated edge present along free margins of valve (Plate 15f, g).

Central adductor muscle scars: Typical for genus (Fig. 10b).

FIG. 12. *Cycloleberis zealandica* (Baird, 1850), juvenile female, USNM 156744: *a*, outline of carapace, length 5.5 mm. Juvenile female, USNM 156968, length 6.2 mm: *b*, endopodite of right 2nd antenna, medial view. Juvenile female, USNM 156966, length 5.7 mm: *c*, endopodite of right 2nd antenna, medial view. Juvenile male, USNM 156672: *d*, outline of carapace, length 5.0 mm; *e*, drawing of ends of central adductor muscles after removal of right valve, anterior to right; *f*, endopodite of left 2nd antenna, lateral view; *g*, endopodite of right 2nd antenna, medial view; *h*, coxale endite of left mandible, medial view; *i*, medial eye and rod-shaped organ; *j*, upper lip, anterior to left; *k*, posterior of animal, anterior to left; *l*, Y-Sclerite, anterior to right. Juvenile male, USNM 156695: *m,n*, medial views of endopodites of left and right 2nd antennae.

Size: USNM 156673, length 5.8 mm, height 5.0 mm; USNM 156744, length 5.5 mm, height 4.7 mm; USNM 156966, length 5.7 mm, height 5.0 mm; USNM 156968, length 6.2 mm, height 5.2 mm; USNM 150299, length 5.5 mm, height 4.8 mm; USNM 156973, length 5.7 mm, height 5.0 mm; USNM 156976, length 5.8 mm, height 4.9 mm.

First antenna (Fig. 10c): 1st joint with medial, lateral, and ventral hairs; 2nd joint spinous with six dorsal bristles and 9–13 lateral bristles; 3rd joint with 13–16 dorsal bristles and 1 minute ventral bristle; 4th joint with one dorsal and five ventral bristles; sensory bristle of 5th joint with 2–4 (rarely 6) short filaments along dorsal margin of stem and 15–16 (rarely fewer) long

filaments on broad distal part (distal short filament close to longer terminal filaments); 6th joint with long spinous medial bristle, short hairs on lateral surface, and on some specimens also on medial surface. Seventh joint: a-claw equal in length to joints 5–8, bare; b-bristle about twice length of a-claw, with 12 short filaments; c-bristle longer than b-bristle, with about 15 filaments. Eighth joint: d- and e-bristles bare, slightly shorter than b-bristle; f-bristle about same length as b-bristle, with 12 or more filaments; g-bristle similar to c-bristle. The distribution of filaments on the sensory bristle of the 5th joints of six specimens is shown in Table 2.

TABLE 2. Distribution of filaments on sensory bristle of 5th joint of first antenna in *Cycloleberis zealandica*, female, A-1 instar?

Specimen number (length of valve, mm)	Number of filaments (short/long distal) Left limb	Right limb
USNM 156744 (5.5)	3/15	3/15
USNM 150299 (5.5)	2/15	2/15
USNM 156673 (5.8)	6/ca. 9	3/ca. 11
USNM 156968 (6.2)	3/16	4/16
USNM 156973 (5.7)	no data	3/15
USNM 156976 (5.8)	no data	4/15

Second antenna: Protopodite with short medial bristle, and long hairs along ventral and dorsal margins (Fig. 10d). Endopodite (Figs 10d, 12b, c): 1st joint distinctly divided into short proximal and longer distal parts; proximal part with 7–11 short bristles, distal part with 7–10 short bristles; 2nd joint elongate with 2–4 short bristles; 3rd joint short with long terminal filament with blunt tip. Exopodite: 1st joint with hairs along dorsal margin and short, terminal, medial bristle; bristles of joints 2–8 with natatory hairs and short, stout, rounded, proximal spines present along ventral margin; 9th joint with five bristles (three long, one medium, one short) with natatory hairs (dorsal bristle short and with base on medial side of joint; ventral spines present on two long bristles); joints 2–8 with basal spines; spine of 8th joint about one-third to one-half length of 9th joint; lateral spine of 9th joint slightly smaller than spine of 8th joint; joints 2–8 with spines and short hairs along distal margins. The number of bristles on endopodites of seven specimens is shown in Table 3.

Mandible (Fig. 10e): Coxale endite: dorsal branch broken off the two specimens examined in detail; ventral branch with seven or eight oblique rows of spines and tip with three stout teeth (dorsal of these with blunt tip) (Fig. 10f). Basale: endite with two end bristles (one stouter and longer than other) with teeth along distal two-thirds, about 22 triaenid bristles with about 15–22 paired spines, and about 10 short, slender, bare bristles; ventral margin of basale with about 20 triaenid bristles of same type as on endite, about 13 short, slender, bare bristles, and 4 spinous subterminal bristles; dorsal margin of basale with about 9 short , slender, bare bristles, and 6 subterminal bristles (2 very long, 2 medium, 2 short); medial surface of basale hirsute, especially in proximal dorsal corner. Exopodite hirsute, reaching just past proximal end of 1st endopodial joint, with two short ventral bristles. Endopodite: 1st joint with eight or nine ventral bristles (two long, 4–5 medium, two short); dorsal margin and medial side near dorsal margin of 2nd joint with numerous bristles; ventral margin of 2nd joint with medium and long bristles forming two distal groups, one subterminal, one terminal (subterminal group with 3–5 bristles, terminal group with two); end joint with three long, bare claw-like bristles, and three slender bristles, some with spines.

Maxilla (Fig. 10g): Epipodial appendage long, slender, reaching distal group of bristles on dorsal margin of basale, with minute spines. Endites consisting of ten stout bristles and 10 short, slender bristles. Basale: medial side hirsute, with 11 proximal bristles near dorsal margin; medial side near distal margin with about nine short bristles and one long bristle, the latter bristle near ventral margin; ventral margin with about 27 short bristles followed by 2 long subterminal bristles and 1 long terminal bristle; dorsal margin hirsute, with five or six bristles (one long, four or five short); lateral side with one short proximal bristle. Endopodite: 1st joint spinous, with one short, dorsal, midbristle and one long, spinous, alpha-bristle; short end joint with six spinous bristles (three short, one medium, two long). Exopodite with three bristles on short lobe.

Fifth limb (Fig. 10h): Dorsal margin of comb hirsute, with 26 short bristles on proximal two-thirds. Exopodial bristles consisting of two hirsute bristles (one stout, one slender), four minute bristles between the two long

TABLE 3. Number of bristles on endopodite of second antenna in *Cycloleberis zealandica*, female, A-1 instar?

Specimen number (length of valve, mm)	*1st joint* Left limb (proximal /distal)	Right limb (proximal /distal)	*2nd joint* Left limb	Right limb	*3rd joint* Left Limb	Right limb
USNM 156968 (6.2)	10/10	11/9	2	2	1	1
USNM 156976 (5.8)	n.d.	8/8	n.d.	2	n.d.	1
USNM 156673 (5.8)	8/10	9/9	4	3	1	1
USNM 156966 (5.7)	n.d.	7/7	n.d.	4	n.d.	1
USNM 150299 (5.5)	8/10	9/10	4	3	1	1
USNM 156744 (5.5)	9/9	7/10	3	3	1	1
USNM 156973 (5.7)	n.d.	7/8	n.d.	3	n.d.	1

n.d. = no data

bristles and five to eight short bristles almost on ventral margin; two bristles in distal ventral corner with bases on lateral side slightly inward from ventral margin.

Sixth limb (Fig. 11a): Anterior margin with distinct upper suture near middle of margin and much smaller lower suture; anterior margin proximal to upper suture with bristles forming three rows (24 bristles in medial row, 31 bristles in middle row, and about 44 shorter and more slender bristles in lateral row); anterior margin between upper and lower sutures also with bristles forming three rows (5 bristles in medial row, 6 bristles in middle row, and 11 slender bristles in lateral row); anterior margin ventral to lower suture with single row of 12 slender bristles similar to those in lateral row; all bristles along anterior margin spinous; ventral margin of end joint and medial surface near ventral margin with abundant bristles; posterior end of end joint with six short hirsute bristles; limb hirsute; five short bristles present in place of epipodial appendage.

Seventh limb: Each limb with 170–200 bristles, 85–100 on each side; proximal rings with one bristle on each side, distal rings with two or three bristles on each side; each bristle with 3–9 bells and without marginal spines; terminus with opposing combs, each with about 36 teeth (Fig. 11b).

Furca (Fig. 11c,d): Each lamella with three primary claws followed by nine or ten bristles; anterior bristle of the ten shorter than others; primary claws with a medial and lateral row of teeth of equal length along posterior margin; bristles with slender spines (some stronger than others) along anterior and posterior margins; medial side of primary claws with long spines near base and shorter spines forming row near anterior margin; margin of lamella between bristles hirsute; anterior bristle of left lamella close to posterior claw; anterior bristle of right lamella separated from posterior claw by space equal in length to width of base of posterior claw; concavity in lamella between claws 1 and 2 with greatest depth 27–28 percent of greatest width (*see* Kornicker, 1975a: 10, for method of measuring concavity); concavity in lamella between claws 2 and 3 with greatest depth 44–45 percent of greatest width.

Rod-shaped organ: Elongate with suture proximal to middle, broadening distal to suture and then tapering to rounded tip (Fig. 11f).

Eyes: Medial eye bare, pigmented (Fig. 11f). Lateral eye pigmented with over 50 ommatidia (Fig. 11e).

Upper lip: Consisting of two hirsute lobes with hirsute lateral flap on each side; saddle between lobes hirsute; no spines present (Fig. 11g).

Posterior of body (Fig. 11h): Hirsute segment above furca followed by short rounded hirsute segment, then longer hirsute segment, short bare segment, and long hirsute posterodorsal segment.

Anterior of body: Small rounded process present between upper lip and medial eye.

DESCRIPTION OF JUVENILE MALE, A-1? INSTAR (Fig. 12d–n, Plates 16–21)

Carapace: Shape of carapace similar to that of previously described female (Fig. 12d).

Ornamentation: Anterior margin of valve with unscalloped narrow rim similar to that of female (Plate 16d–f). Surface of valves similar to that of female in having short ribs (Plates 16 a,d,f, 17d, f, 18c), shallow fossae with short bristle (Plates 17d,f, 18 a–c), and bristles emerging from open pores with concentric rims (Plate 17d,e,). In addition, open pores without bristles are present between fossae (Plate 18c,d).

Infold: Rostral and anteroventral infold with numerous bristles (Plates 18e,f, 19a–d); list along anteroventral infold with lamellar prolongation (Plate 19a–d). Posteroventral and posterior infold bristles of varying types (Plates 19f, 20, 21): long tubular bristles with pores at base (Plates 20f, 21), short bristles emerging from open pores (Plate 20b–e), long bristles emerging from open pores (Plate 20b–d), and short tubular processes (Plate 20b). Few bristles emerging from open pores present between posterior list and posterior margin of valve (Plate 20c); bristles present near posteroventral valve edge just anterior to selvage (Plate 20a).

Selvage: Lamellar prolongation with fringe present along anterodorsal margin of valve (Plates 18e, 19e); edge of prolongation smooth or serrate elsewhere (Plates 17c, 19b,d).

Central adductor muscle scars: Typical for genus (Fig. 12e).

Size: USNM 156965, length 5.1 mm, height 5.0 mm; USNM 156672, length 5.0 mm, height 4.0 mm.

First antenna: 2nd joint with 4–5 dorsal bristles and 4–5 lateral bristles; 3rd joint with 11 dorsal bristles and 1 minute ventral bristle; 4th joint with one dorsal bristle and four ventral bristles; sensory bristle of 5th joint with three short filaments and 13 long distal filaments (the distal of the short filaments very close to the proximal long filament); f-bristle of 8th joint with about 20 filaments; remainder of limb not examined in detail but, in general, similar to that of previously described female.

Second antenna: Endopodite 3-jointed (Fig. 12f,g,m,n): 1st joint with 6–8 short bristles on proximal part and 6–9 short bristles on distal part; 2nd joint elongate with 4–6 short ventral bristles; 3rd joint about same length as 2nd joint, with one long proximal filament and minute terminal bristle. Protopodite and exopodite similar to those of previously described female.

Mandible: Coxale endite (Fig. 12h): ventral branch with spines forming about seven oblique rows and tip with three teeth (dorsal tooth with square end with minute spines); short slender medial spine near base of ventral branch; ventral margin of dorsal branch with four processes having backward pointing spines followed by five processes with anteriorly pointing spines; terminal bristle present at tip of branch. Ventral margin of 2nd endopodite joint with four bristles in subterminal

group and two in terminal group; remainder of mandible not examined in detail but, in general, similar to that of previously described female.

Maxilla: End joint with six bristles; remainder of appendage not examined in detail but, in general, similar to that of previously described female.

Fifth limb: Proximal two-thirds of dorsal margin of comb with only 13 bristles, limb otherwise similar to that of previously described female.

Sixth limb: Posterior end of end joint with five short hirsute bristles; four bristles present in place of epipodial appendage; remainder of limb similar to that of previously described female, but bristles not counted.

Seventh limb: Opposing terminal combs each with about 28 teeth; bristles cylindrical, similar to those of previously described female, but not counted.

Furca: Each lamella with three stout claws followed by nine bristles.

Rod-shaped organ (Fig. 12i), *eyes, upper lip* (Fig. 12j), *posterior* (Fig. 12k) *and anterior of body*: Similar to those of previously described female.

Subfamily CYLINDROLEBERIDINAE Müller, 1906

This subfamily was represented in the collections by a single genus, *Diasterope* Poulsen, 1965. Other genera in this subfamily that have been reported from the vicinity of New Zealand are *Parasterope* Poulsen, 1965, *Dolasterope* Poulsen, 1965, *Synasterope* Poulsen, 1965, and *Bathyleberis* Kornicker, 1975.

Key to Genera in the Vicinity of New Zealand

1 Bristles between primary claws of furca ..... *Dolasterope*
No bristles between primary claws of furca 2
2 8th joint of 1st antenna with d-bristle at least one-fifth as long as e-bristle ..... *Bathyleberis*
8th joint of 1st antenna with d-bristle missing or less than one-fifth as long as e-bristle 3
3 Without a long lateral bristle between b- and c-bristles on dorsal margin of 2nd joint of mandibular endopodite ..... *Synasterope*
With a long lateral bristle between b- and c-bristles on dorsal margin of 2nd joint of mandibular endopodite 4
4 Sensory bristle on 5th joint of female 1st antenna with short proximal filament ..... *Diasterope*
Sensory bristle on 5th joint of female 1st antenna without short proximal filament ..... *Parasterope*

Diasterope Poulsen, 1965

TYPE-SPECIES: *Diasterope pilosa* Poulsen, 1965, subsequent designation by Kornicker (1975:388).

DISTRIBUTION: Members of this genus are widespread and have been collected as far south as the Ross Sea and as far north as the Strait of Georgia, Canada. The known benthic depth range is 11–400 m. Males have been collected at the surface in plankton nets.

Diasterope was represented in the collections by one species, *Diasterope grisea* (Brady, 1898). The species had been previously reported by Brady (1898:432) from Akaroa Harbour, which is near the middle of the eastern coast of South Island. The present record extends the range to Tasman Bay on the northern end of South Island. No other member of *Diasterope* has been reported from New Zealand.

Diasterope grisea (Brady, 1898) (Fig. 13, Plates 22–24)

Asterope grisea Brady, 1898:432, pl. 43:figs. 9–14. Müller, 1912:43,46. Skogsberg, 1920:440.
Cylindroleberis? grisea (Brady). Eagar, 1971:61.
Diasterope grisea (Brady). Kornicker, 1975:389, figs. 245, 246.

HOLOTYPE: Not designated.

SYNTYPE–LOCALITY: Akaroa Harbour, New Zealand, 11 m.

MATERIAL: USNM 156667, 1 adult male from NZOI Stn K175; USNM 156670, 1 adult? female from NZOI Stn K126; USNM 156754, 1 adult female from NZOI Stn K152; USNM 156983, 1 specimen from NZOI Stn K146; USNM 156755, 1 adult female from NZOI Stn K170; USNM 156984, 1 specimen from NZOI Stn K154; USNM 156756, 1 juvenile from NZOI Stn K174; USNM 156672, 1 specimen from NZOI Stn K176; USNM 156669, 1 adult female with nematodes from NZOI Stn K178 (deposited in Division of Worms, National Museum of Natural History, Smithsonian Institution).

DISTRIBUTION: Akaroa Harbour, and Tasman Bay, New Zealand.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Fig. 13a–f).

Size: USNM 156669, length 2.70 mm, height 1.31 mm (Fig. 13a); USNM 156670 (may not be adult; with small, unextruded eggs), length 2.48 mm, height 1.30 mm (Fig. 13d).

Adductor muscle attachment scars: Consisting of about 18 individual ovoid scars (Fig. 13b).

Mandible: USNM 156670 with four midbristles on dorsal margin of basale.

Eyes: Lateral eye pigmented, with about 20 ommatidia (Fig. 13c). Medial eye bare, very lightly pigmented (Fig. 13e).

Rod-shaped organ: Organ of USNM 156670 two-jointed, with sleeve-like midjoint (Fig. 13e).

Upper lip: Only one anterior spine observed on one of the lobes of USNM 156670 (Fig. 13f).

Parasites: USNM 156669 with juvenile and adult parasitic nematodes.

SUPPLEMENTARY DESCRIPTION OF ADULT MALE (Fig. 13g, Plates 22–24)

Carapace: Bristles present along anterior margin of rostrum (Plate 22b) and forming vertical row near posterior end of shell (Plate 22a,c–e); the latter bristles emerge from open rimmed pores (plate 22e,f); long bristles sparsely distributed over valve surface; these

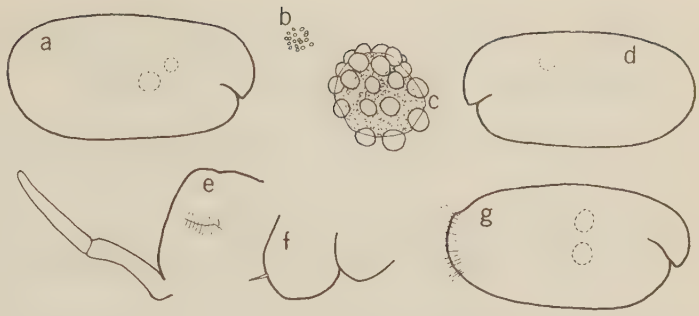

FIG. 13. *Diasterope grisea* (Brady, 1898), adult female, USNM 156669: *a*, outline of carapace showing position of lateral eye and central adductor muscle scars, length 2.70 mm; *b*, sketch of central adductor muscle scars of right valve, lateral view, anterior to right; *c*, left lateral eye, anterior to right. Female (may not be adult), USNM 156670: *d*, outline of carapace showing position of lateral eye, length 2.48 mm; *e*, medial eye and rod-shaped organ; *f*, upper lip, anterior to left. Adult male, USNM 156667: *g*, outline of carapace showing position of lateral eye and central adductor muscle scars, length 2.74 mm.

emerge from open pores with about seven more-or-less concentric rims (Plate 23a–c).

Size: USNM 156667, length 2.74 mm, height 1.38 mm (Fig. 13g).

Infold (Plates 23d–f, 24): Pore-fields at base of flap-like bristles with as many as ten pores with low tubular rims and about four pores with long tubes; the latter located posterior to pores with low rims (Plates 23d–f); tubular bristles with many branches present between pore fields (Plates 23e, 24a); infold between posterior list and posterior edge of valve with tubular processes (Plates 23e, 24d) and minute rimmed pores with central process (Plates 23e, 24b,c).

Mandible: Dorsal margin of basale with two mid-bristles.

Parasterope Poulsen, 1965

TYPE-SPECIES: *Asterope muelleri* Skogsberg, 1920, by subsequent designation (Kornicker, 1975a:401).

DISTRIBUTION: Members of this genus are world-wide at all depths. No members were in the present collection. Previously recorded species from the vicinity of New Zealand are *Parasterope crinita* Kornicker, 1975, *P. quadrata* (Brady, 1898), and *P. pectinata* Poulsen, 1965.

Key to Species in the Vicinity of New Zealand

1 Dorsal margin of mandibular basale with long hairs and short spines ..... *P. crinita* Kornicker, 1975
Dorsal margin of mandibular basale without hairs and spines 2
2 Distal corner of dorsal margin of 2nd joint of 1st antenna with row of long stout hairs ..... *P. pectinata* (Poulsen, 1965)
Distal corner of dorsal margin of 2nd joint of 1st antenna without long hairs ..... *P. quadrata* (Brady, 1898)

Dolasterope Poulsen, 1965

TYPE-SPECIES: *Dolasterope johansoni* Poulsen, 1965, monotypy.

DISTRIBUTION: The genus is known only from one specimen, *D. johansoni* Poulsen, 1965, collected at the entrance to Milford Sound, New Zealand. No specimens were in the present collections.

Bathyleberis Kornicker, 1975

TYPE-SPECIES: *Bathyleberis grossmani* Kornicker, 1975

DISTRIBUTION: This genus has been collected mostly in the southern oceans between latitudes of 41°S and 61°S, but has recently been reported along the coast of California by Baker (1975). Members of the genus were not in the present collections. *Bathyleberis oculata* Kornicker, 1975, was reported from Cook Strait at a depth of 117 m by Kornicker (1975a: 551).

Synasterope Poulsen, 1965

TYPE-SPECIES: *Synasterope implumis* Poulsen, 1965, by subsequent designation (Kornicker, 1975a:440).

DISTRIBUTION: This genus is widespread. The northernmost latitude at which it has been collected is about 30°N. The southernmost latitude is in the Weddell Sea, Antarctica (—73°S). Adult males have been collected at the surface. Members are found in shallow water as well as at abyssal depths. No members were in the present collections. *Synasterope empoulseni* Kornicker, 1975, has been reported from Stewart Island by Poulsen (1965: 406) and may also occur near Three Kings Islands (*see* Kornicker, 1975a: 447).

Family SARSIELLIDAE Brady and Norman, 1896

Only one genus of the family has been reported from the vicinity of New Zealand, *Cymbicopia* Kornicker, 1975.

Cymbicopia Kornicker, 1975

TYPE-SPECIES: *Sarsiella hanseni* Brady, 1898.

DISTRIBUTION: This genus has been collected only in bays and harbours of New Zealand at depths of 15 m or less. No members were in the present collections. Previously recorded species are *Cymbicopia zealandica* (Poulsen, 1965), *C. hanseni* (Brady, 1898), *C. hispida* (Brady, 1898), and *C. brevicosta* Kornicker, 1975.

Key to Species in the Vicinity of New Zealand

1 Carapace with prominent posterodorsal process, female carapace with prominent rostrum 2
Carapace without posterodorsal process, female carapace without prominent rostrum 3

2 Carapace of adult female shorter than 1.20 mm ..... *C. hispida* (Brady, 1898)
Carapace of adult female longer than 1.35 mm. ..... *C. zealandica* (Poulsen, 1965)

3 Midrib of carapace extending posteriorly past middle of carapace; furca with 4 (rarely 5) claws on each lamella ..... *C. hanseni* (Brady, 1898)
Midrib of carapace not reaching posteriorly past middle of carapace; furca with 6 or 7 (rarely 5) claws on each lamella ..... *C. brevicosta* Kornicker, 1975

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PLATES

PLATE 1. *Metavargula mazeri* n.sp., holotype, length 4.34 mm, number H212, left valve, outside views: *a*, complete valve × 18.5; *b*, ventral view, anterior to left, × 18.5; *c*, posterior view, venter to left, × 21; *d*, anterior view, venter to right, × 21; *e*, dorsal view, anterior to right, × 18.5; *f*, tip of rostrum, lateral view, from *a*, × 528.

PLATE 2. *Metavargula mazeri* n.sp., holotype, number H212, left valve, outside view: *a*, incisur, lateral view, × 167; *b*, detail of *a*, × 1408; *c*, striations on anterior of shell, from *a*, × 2156; *d*, setose bristle, from *b*, × 7040; *e*, bristle emerging from rimmed pore, from part of valve just ventral to *b*, × 7040; *f*, bristle emerging from rimmed pore, from *b*, × 7040.

PLATE 3. *Metavargula mazeri* n.sp., holotype, number H212, left valve, outside view: *a*, tip of caudal process, lateral view, × 229; *b*, tip of caudal process, perpendicular view, × 304; *c*, bristle emerging from noded open pore, from *a*, × 2200; *d*, pore shown in *c*, × 7040; *e*, broken bristle emerging from noded open pore, from *a*, × 7040; *f*, rimmed and simple pores without bristles from near middle of valve, × 9460.

PLATE 4. *Metavargula mazeri* n.sp., holotype, length 4.34 mm, number H212, left valve, inside view: *a*, complete valve, × 17.5; *b*, rostrum and incisur, from *a*, × 132; *c*, caudal process, from *a*, × 53; *d*, detail of knob in *c*, × 462; *e*, detail of bristle on knob shown in *d*, × 3388; *f*, pores on caudal process, from *c*, × 506.

PLATE 5. *Metavargula mazeri* n.sp., holotype, number H212, left valve, inside view: *a*, bristles and processes on list of caudal process, from Plate 4*c*, × 1584; *b*, bristle and process in *a*, × 5082; *c*, pore on inner side of caudal process, from Plate 4*f*, × 9240; *d*, posteroventral part of valve, from Plate 4*a*, × 132; *e*, bristle on infold shown in *d*, × 2640; *f*, bristles on infold of rostrum, from Plate 4*a*, × 506.

PLATE 6. *Metavargula mazeri* n.sp., holotype, number H212, left valve, lamellar prolongation of selvage: *a*, from part of selvage ventral to incisur, inside view, × 8000; *b*, from part of selvage along anteroventral margin, outside view, × 8000.

PLATE 7. *Cypridinodes concentrica* n.sp., paratype, length 4.82 mm, USNM 156665, left valve, outside view: *a*, complete valve, lateral view, × 17.5; *b*, ventral view, anterior to left, × 19.5; *c*, dorsal view, anterior to right, × 19.5; *d*, anterior view, venter to right, × 25.5; *e*, posterior view, venter to left, × 26.5; *f*, detail of rostrum and incisur, from *d*, × 128.

PLATE 8. *Cypridinodes concentrica* n.sp., paratype, USNM 156665, left valve, outside view: *a*, rostrum and incisur, from Plate 7*a*, × 79; *b*, incisur, from *a*, × 317; *c*, pores and reticulations on surface, from *a*, × 440; *d*, detail of *c*, × 880; *e*, dish-like fossa, from *a*, × 1760; *f*, bristle emerging from rimmed pore, from *b*, × 4400.

PLATE 9. *Cypridinodes concentrica* n.sp., paratype, USNM 156665, left valve, outside view: *a*, fossa with node at bottom, from right of Plate 8*a*, × 370; *b*, bifurcate process with terminal pores and small tubular pore near base, from lower middle of *a*, × 9680; *c*, ventral oblique view of process in *b*, × 4400; *d*, bifurcate process with terminal pores, from lower left of *a*, × 9680; *e*, bristle emerging from rimmed and noded pore, from Plate 8*a*, × 4400; *f*, broken bristle emerging from rimmed and noded pore, from Plate 8*a*, × 3520.

PLATE 10. *Cypridinodes concentrica* n.sp., paratype, length 4.82 mm, USNM 156665, inside view: *a*, complete valve, × 17.5; *b*, caudal process, from *a*, × 686; *c*, processes along list of caudal process, from *b*, × 510; *d*, detail from *c*, × 2376; *e*, tip of digitate tubular process, from *d*, × 7040; *f*, tubular processes between digitate processes of list, from *d*, × 9680.

PLATE 11. *Cypridinodes concentrica* n.sp., paratype, USNM 156665, inside view: *a*, rostrum and incisur, × 97; *b*, bristles along anteroventral infold, from Plate 10*a*, × 1452; *c*, cross-section of adductor muscle near its attachment to left valve, from Plate 10*a*, × 10,120; *d*, struts between left valve and vestment, from anterodorsal margin in Plate 10*a*, × 1056; *e*, encrustations on anterior part of vestment, from Plate 10*a*, ×968; *f*, detail of individual encrustation shown in *e*, × 2904.

PLATE 12. *Cypridinodes concentrica* n.sp., paratype, USNM 156665, upper lip: *a*, complete lip, lateral view, anterior to right, × 94; *b*, anterior view, × 83; *c*, ventral view, anterior to left, × 94; *d*, right tusk, lateral view, from *a*, × 187; *e*, anterior glandular field, lateral view, anterior to right, fom *a*, × 230; *f*, hairs on lobe posterior to tusks, lateral view, from *a*, × 828; *g*, posterior view of left tusk, × 360; *h*, teeth on proximal lobe of left tusk, anterior to left, × 864; *i*, detail of tooth of right tusk, from *d*, × 1188.

PLATE 13. *Cypridinodes concentrica* n.sp., paratype, USNM 156665, anterior glandular field of upper lip: *a*, ventral view of glandular field, anterior to bottom, × 326; *b*, anterior part of field, from *a*, × 968; *c*, four glandular openings near posterior end of field, × 1936; *d*, detail of glandular openings in *b* showing distorted tubes extending from openings, × 2904; *e*, glandular opening with collapsed tube, from *b*, × 3388; *f*, anterior glandular opening with collapsed tubular process, from lower right of *a*, × 4840.

Plate 14. *Cycloleberis zealandica* (Baird, 1850), A–1? female, length 5.5 mm, USNM 150299, right valve, lateral view: *a*, complete valve (tear in posterodorsal margin), × 7.7; *b*, anteroventral part of valve, from *a*, × 44; *c*, fossae and bristles, from *b*, × 174; *d*, fossae and bristles near lower middle of *c*; *e*, pore and part of bristle in upper left of *d*, × 6313; *f*, surface of fossae in lower right of *d*, × 6313; *g*, fossae and bristles from *b*, × 545; *h*, pore and proximal part of bristle in lower right of *g*, × 5451; *i*, fossa in upper left of *g*, × 1298; *j*, surface structure of fossa in *i*, × 6490; *k*, tear in upper left of valve shown in *a* (upper layer of shell folded under along dorsal edge of tear), × 215; *l*, pores in lower layer of shell exposed in *k*, × 737.

PLATE 15. *Cycloleberis zealandica* (Baird, 1850), A–1? female, length 5.5 mm, USNM 150299, right valve: *a*, anterodorsal margin above rostrum, × 49; *b*, detail of edge of valve shown in *a*, × 965; *c*, inside view of valve, anterior to left, × 12; *d*, rostrum, from *c*, × 58; *e*, anteroventral margin below incisur, from *c*, × 117; *f*, posteroventral margin, from *c* (bristles forming oblique row along left part of infold are on list), × 117; *g*, bristles and selvage from lower right of *f*, × 585; *h*, bristles just below middle of list shown in *f*, × 614; *i*, lower 2 bristles in *h*, × 2281; *j*, bristles near middle of list shown in *f*, × 614; *k*, process near bottom of list shown in *j*, × 5733; *l*, base of stout bristle dorsal to middle of list shown in *j*, × 5733.

PLATE 16. *Cycloleberis zealandica* (Baird, 1850), A–1? male, length 5.0 mm, USNM 156672, left valve, outside view: *a*, complete valve, anterior to left, × 18.5; *b*, dorsal view, anterior to right, × 20; *c*, anterior view, × 19.5; *d*, anterior part of valve, lateral view, from *a*, × 31.5; *e*, incisur, from *d*, × 97; *f*, anterior view of edge of valve dorsal to incisur, × 39.5.

PLATE 17. *Cycloleberis zealandica* (Baird, 1850), A–1? male, USNM 156672, left valve, outside view: *a*, anterior view of edge of valve dorsal to incisur, from Plate 17*f*, × 211; *b*, dorsal view of anterior of valve, from Plate 16*b*, × 70; *c*, anterior view of edge of valve ventral to incisur, from Plate 16*c*, × 211; *d*, ribs, shallow fossae, and bristles of surface of rostrum, lateral view, from Plate 16*e*, × 660; *e*, bristle emerging from open pore with concentric rims (note pore in bristle near its base), from middle of *d*, × 6600; *f*, shallow fossa and bristle emerging from closed pore, from upper middle of *d*, × 2288.

PLATE 18. *Cycloleberis zealandica* (Baird, 1850). A–1? male, USNM 156672, left valve: *a*, proximal part of bristle and shallow fossa, from Plate 17*d*, × 2288; *b*, detail of base of bristle and reticulate surface of fossa, from *a*, × 6600; *c*, ribs shallow fossae containing bristle emerging from closed pore, and two open pores between fossae, from lower right of Plate 16*d*, × 704; *d*, detail of open pore in *c*, × 8800; *e*, complete valve, inside view, anterior to right, × 19; *f*, anterior part of valve, from *e*, × 30.

PLATE 19. *Cycloleberis zealandica* (Baird, 1850), A–1? male, USNM 156672, left valve, inside view: *a*, anterior of valve ventral to incisur, × 66; *b*, anteroventral margin, from Plate 18*e*, × 194; *c*, lamellar prolongation of list, and ridges on infold, from near middle of *a*, × 748; *d*, anteroventral margin showing lamellar prolongations on both list and selvage, and bristles between them, from *b*, × 484; *e*, dorsal margin showing fringed lamellar prolongation of selvage, from Plate 18*e*, × 282; *f*, posteroventral margin, from Plate 18*e*, × 51.

PLATE 20. *Cycloleberis zealandica* (Baird, 1850), A–1? male, USNM 156672, left valve, posteroventral infold: *a*, part of posteroventral margin, from Plate 18*e*, × 202; *b*, detail of bristles along list shown in lower part of *a*, × 924; *c*, part of valve in *a* just above part shown in *b*, × 924; *d*, detail of bristle of list, from lower right of *b*, × 1571; *e*, bristles of list, from middle of *a*; *f*, bristles of list just dorsal to part shown in *a*, × 2125.

PLATE 21. *Cycloleberis zealandica* (Baird, 1850), A–1? male, USNM 156672, left valve, bristles of posteroventral list: *a*, base of long tubular bristle showing pores, from Plate 20*a*, × 7621; *b*, base of long tubular bristle shown in Plate 20*f*, × 8800; *c*, tubular bristle of list with adjacent bristles emerging from open pores, × 6688; *d*, tubular bristle of list; *e*, tip of bristle emerging from open pore of list, from Plate 20*f*, × 9240; *f*, tip of long tubular bristle near middle of Plate 20*b*, × 9240.

PLATE 22. *Diasterope grisea* (Brady, 1898), adult male, length 2.74 mm, USNM 156667, distorted left valve, outside view: *a*, complete valve, lateral view, × 32.5; *b*, incisur and rostrum, from *a*, × 176; *c*, posterior view, × 70; *d*, posterior, from *a*, × 123; *e*, details of posterior bristles, from *d*, × 880; *f*, base of a bristle in *e*, × 8800.

PLATE 23. *Diasterope grisea* (Brady, 1898), adult male, USNM 156667, left valve: *a*, bristle emerging from open pore with concentric rims, from left of Plate 22*e* (note satellite pore on lower right of rim of pore), × 8800; *b*, bristle emerging from rimmed pore (note satellite pore in lower left of rim), × 8800; *c*, rimmed pore from near valve middle, × 12,320; *d*, posterior of valve, medial view, × 110; *e*, part of posteroventral infold, from *d*, × 880; *f*, tubular pores at base of flap-like bristles, from upper part of *e*.

PLATE 24. *Diasterope grisea* (Brady, 1898), adult male, USNM 156667, left valve, inside view: *a*, branched tubular bristles between flap-like bristles of posteroventral list, from middle of Plate 23*e*, × 13,200; *b*, minute rimmed pore with central process between list and valve edge, from Plate 23*e*, × 8800; *c*, another pore similar to that shown in *b*, from Plate 23*e*, × 17,600; *d*, tubular process between list and valve edge, from Plate 23*e*, × 3520; *e*, complete valve, × 37; *f*, rostrum and incisur, from *e*, × 176.

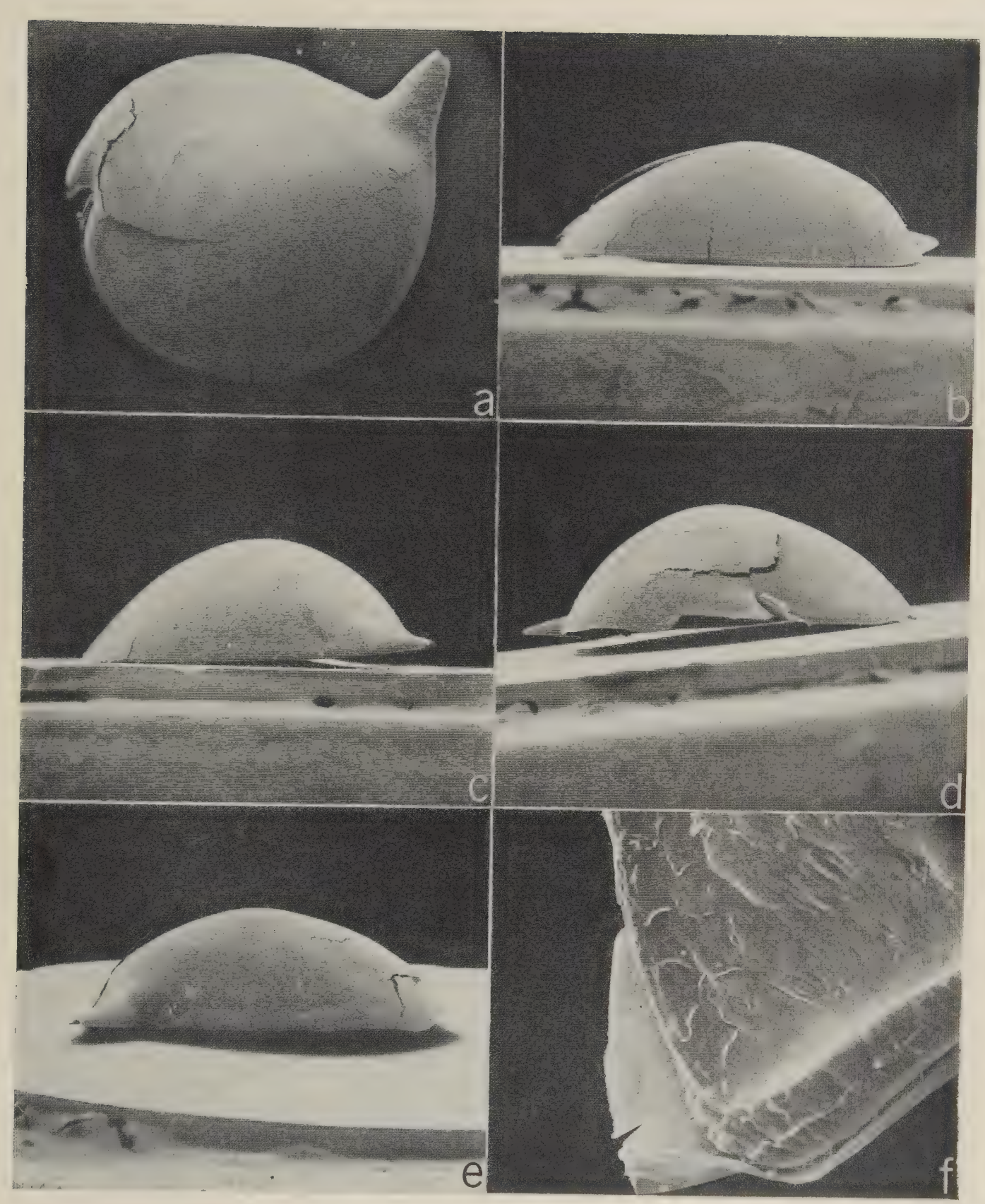
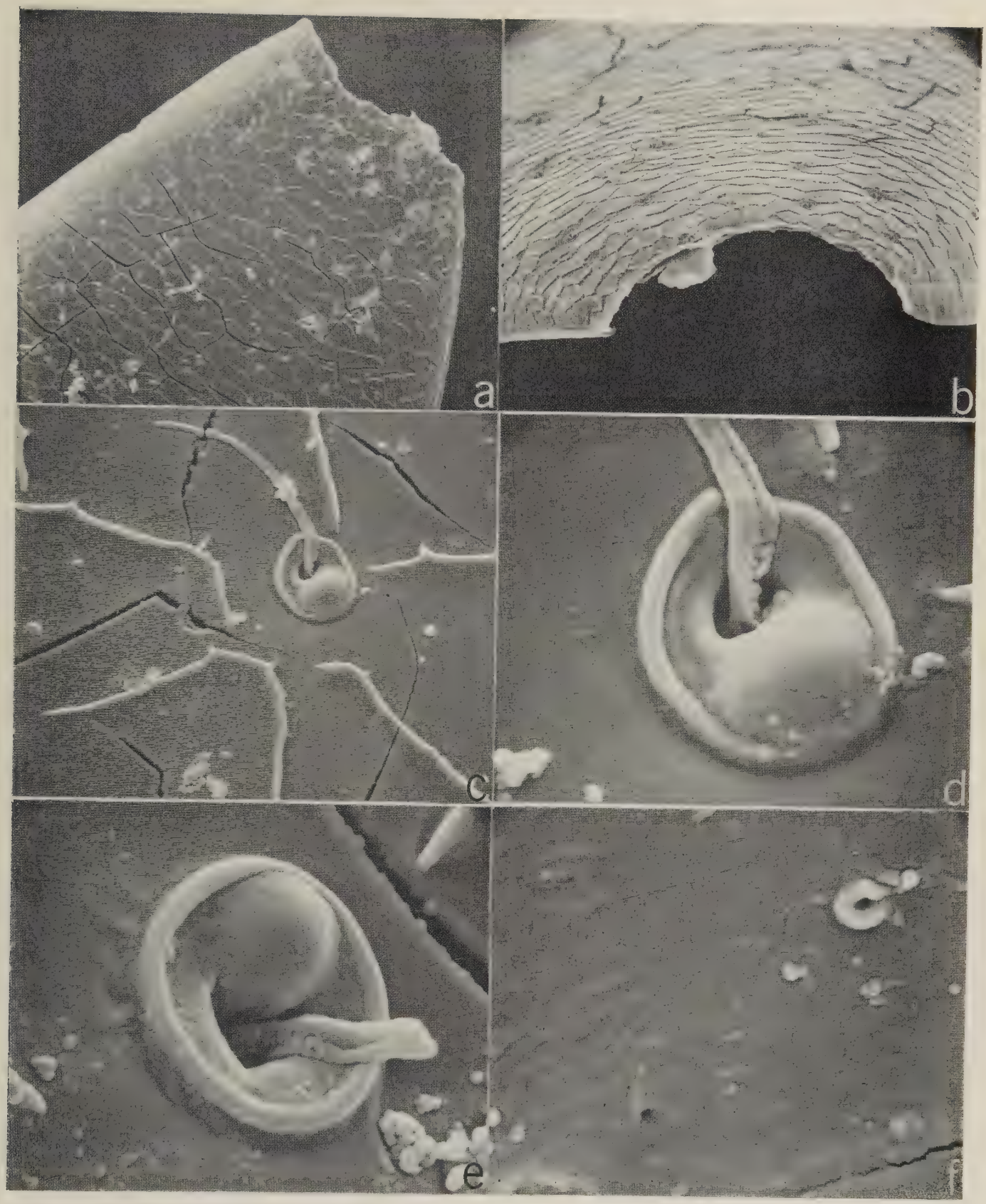


PLATE 1. *Metavargula mazeri* n.sp.

PLATE 2. *Metavargula mazeri* n.sp.



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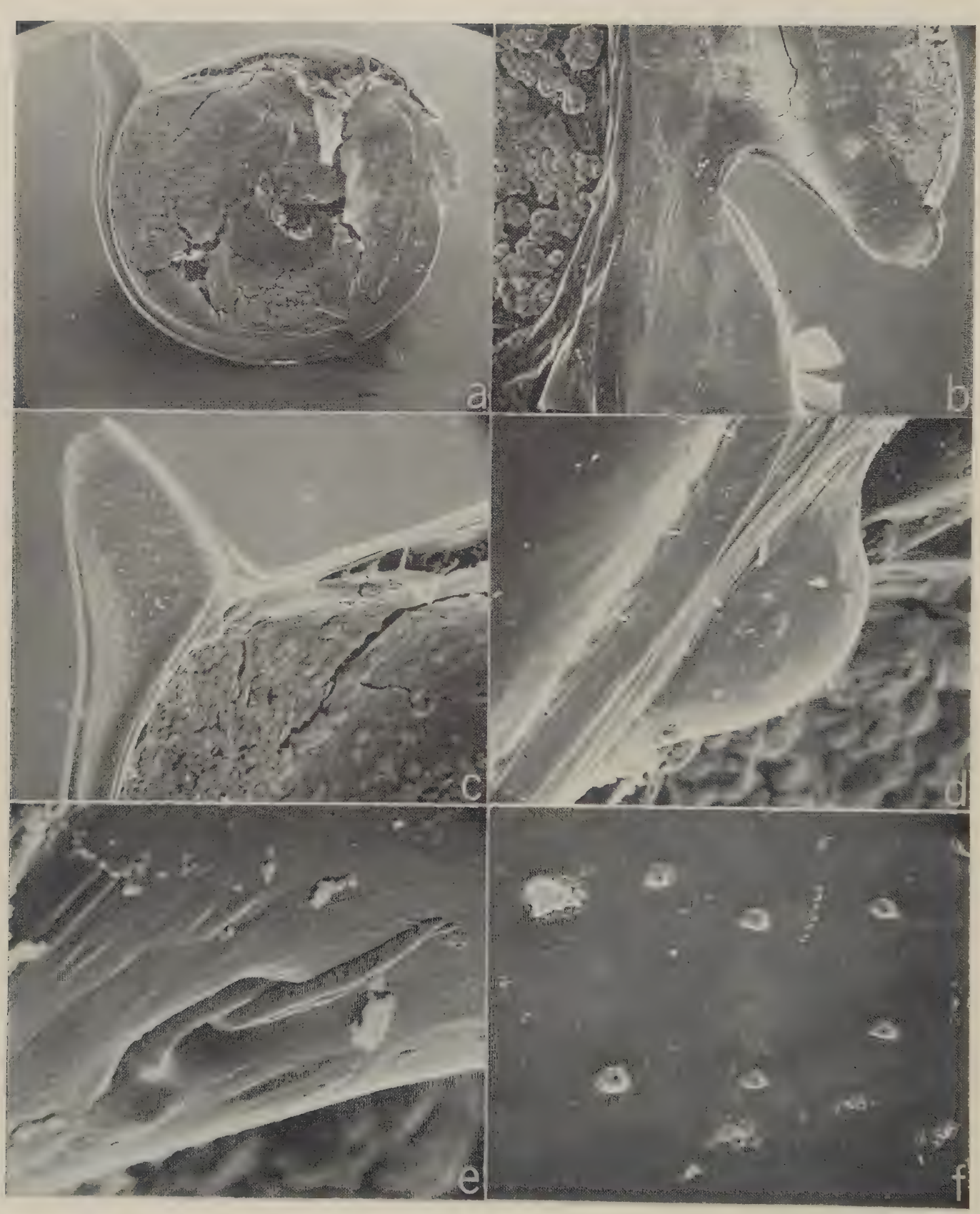

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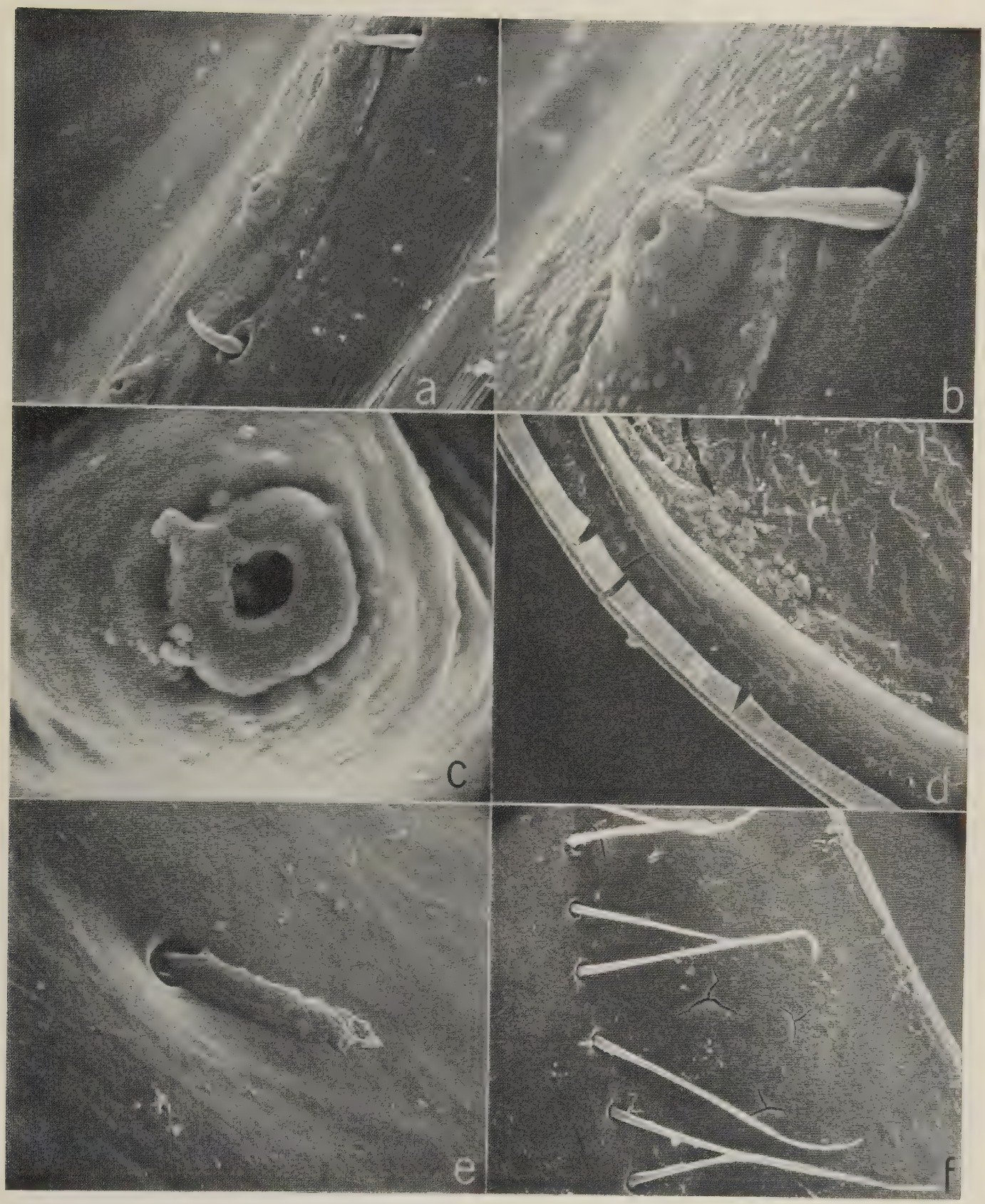

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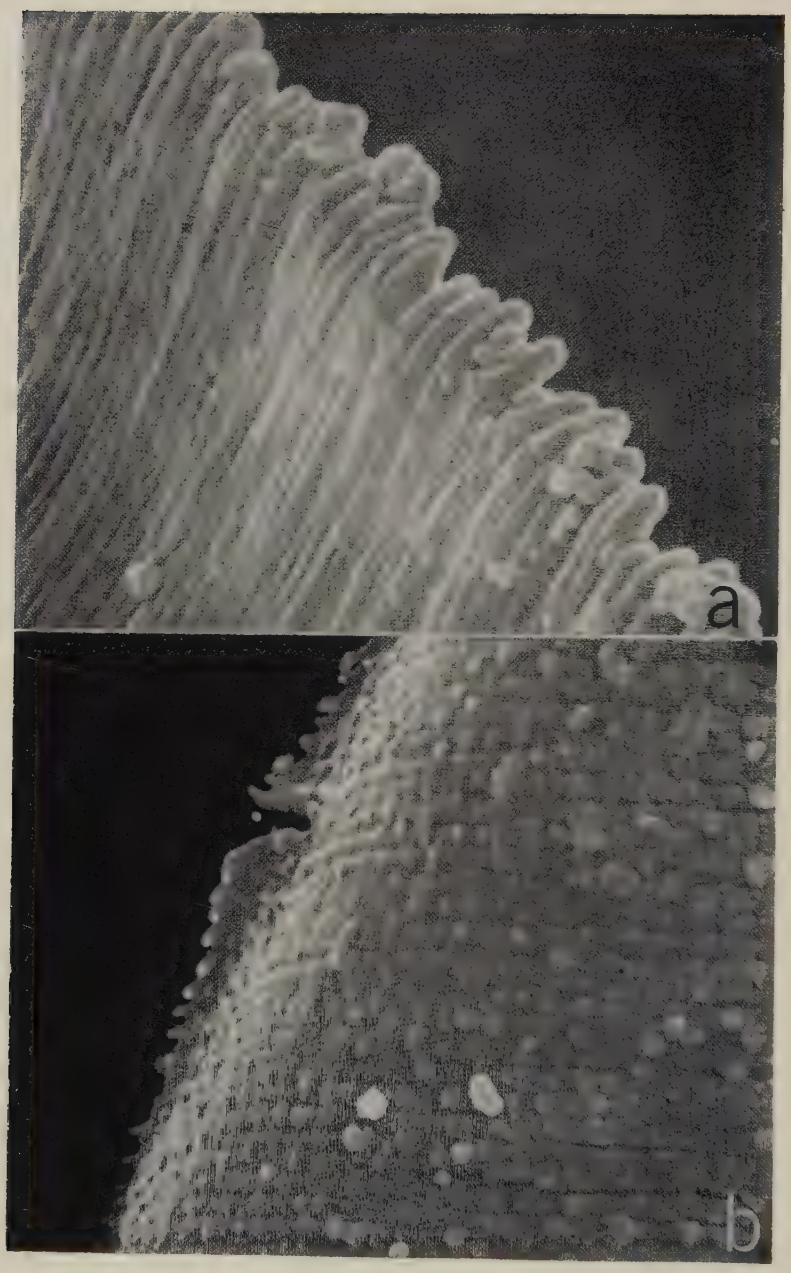

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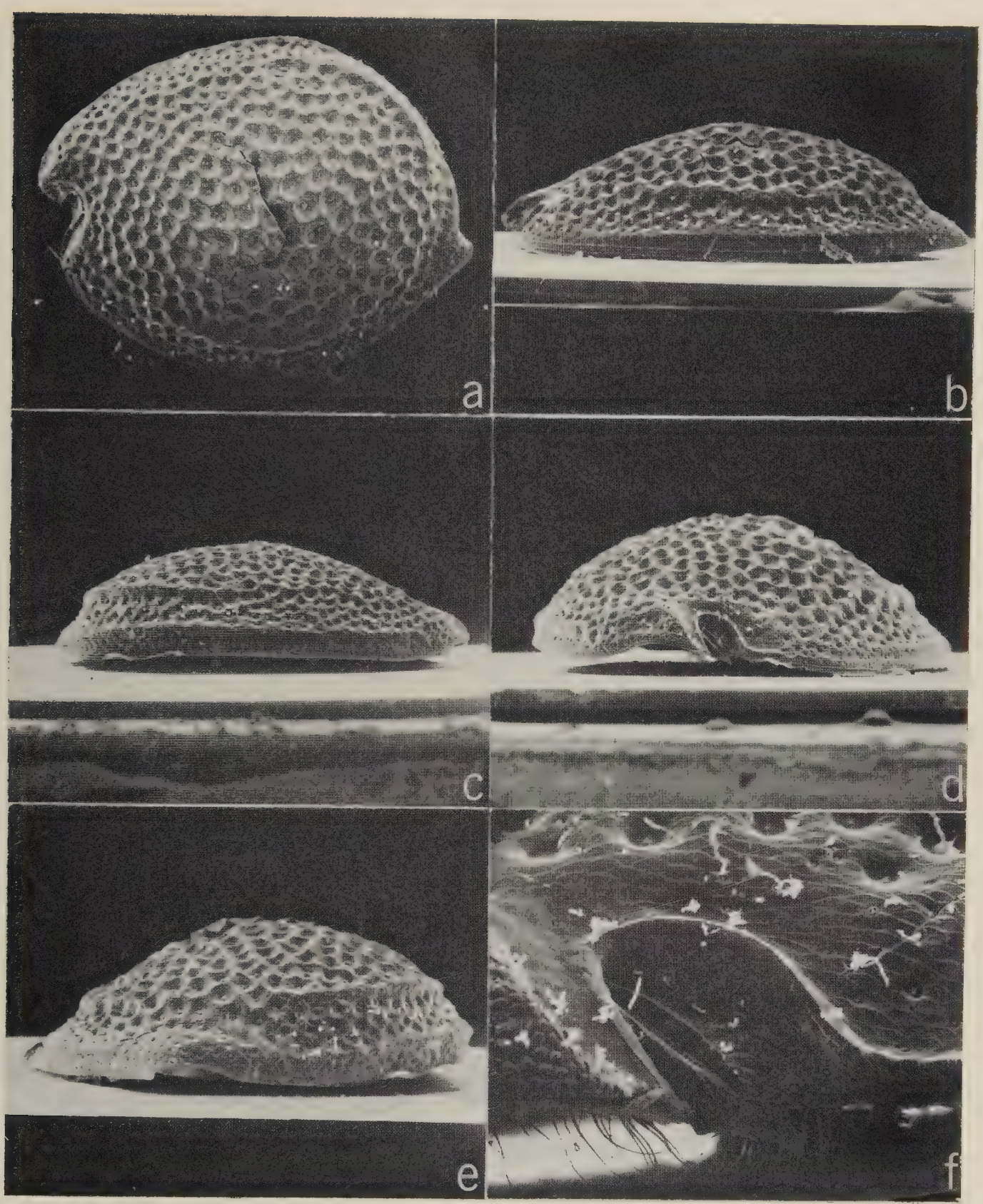

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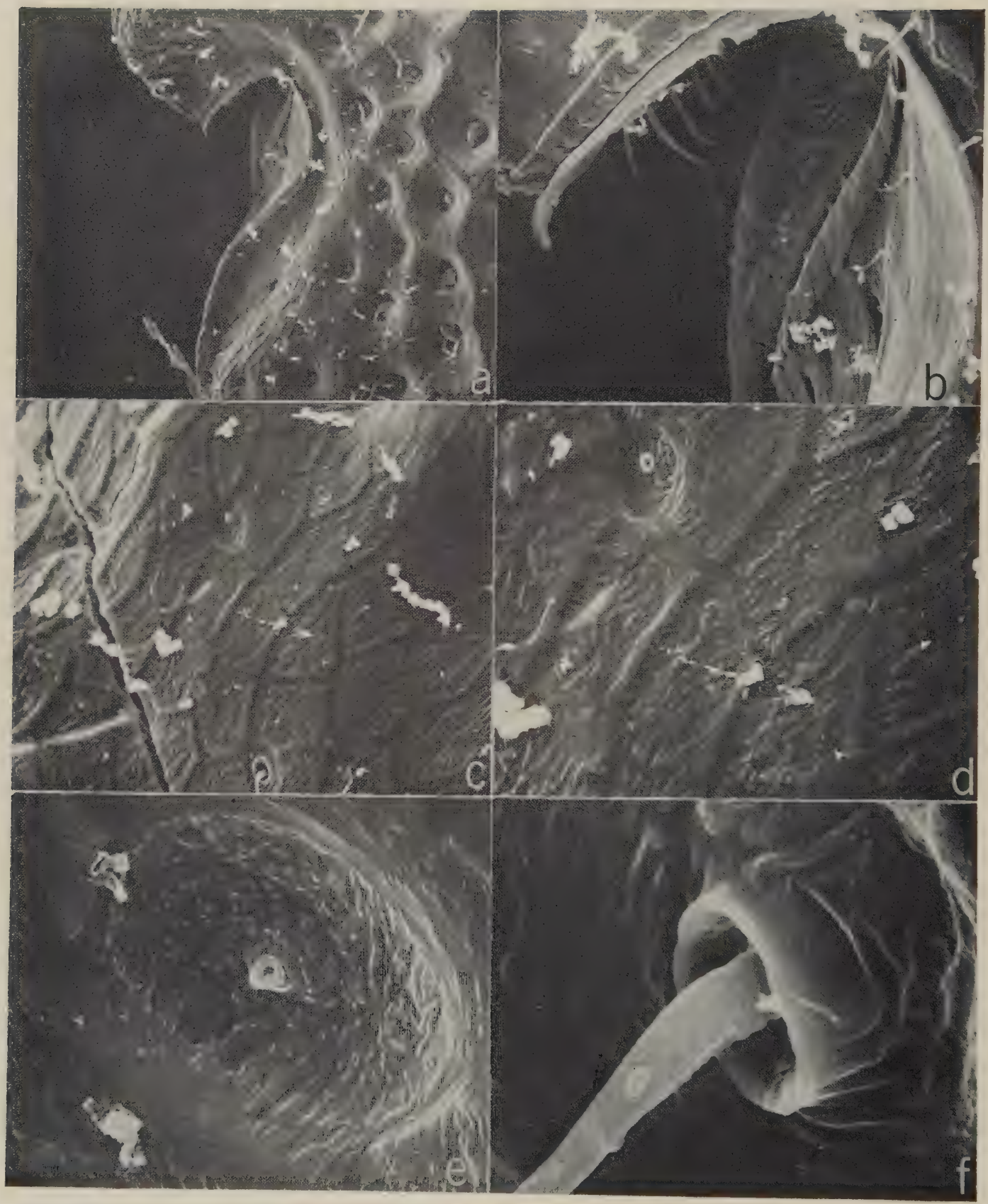

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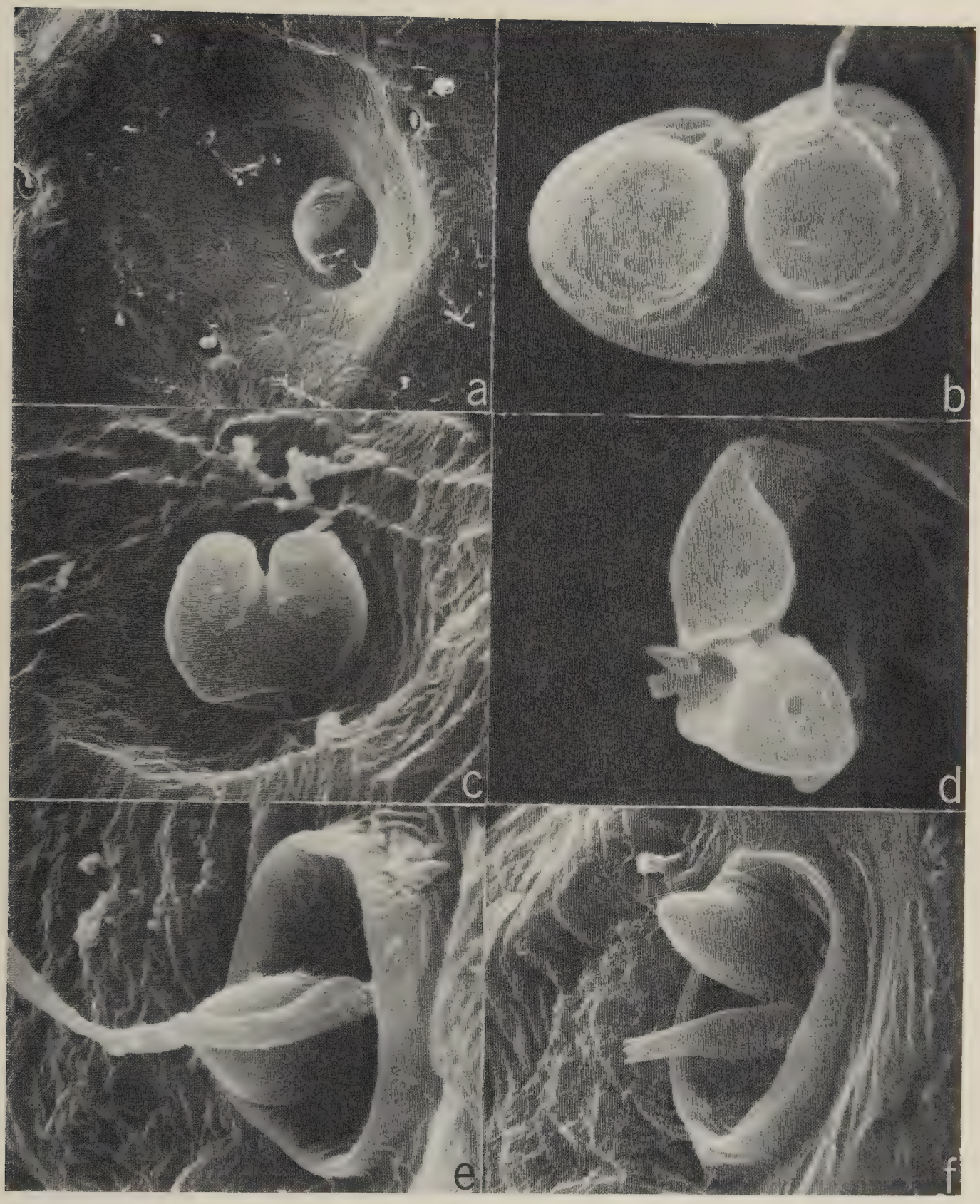

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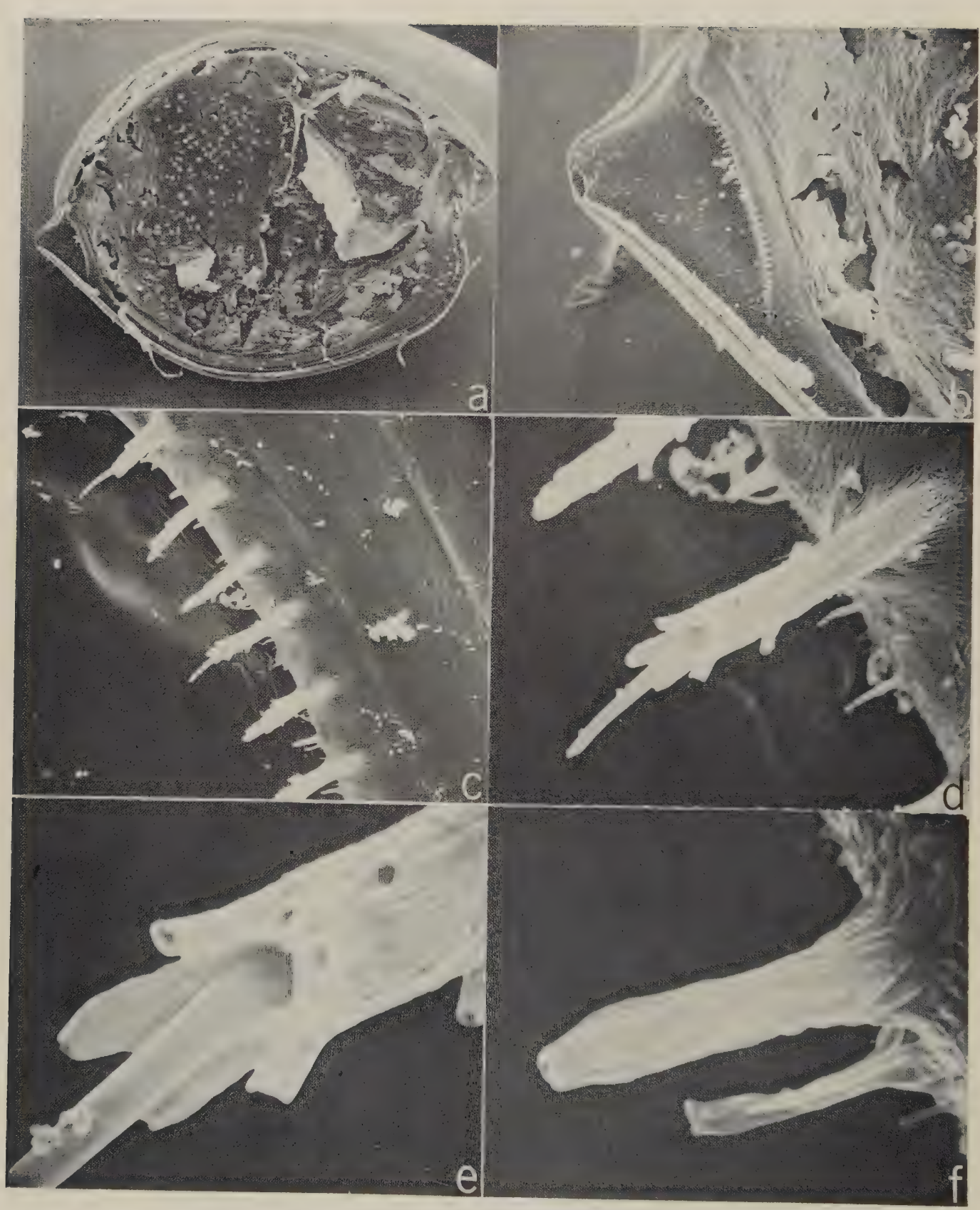

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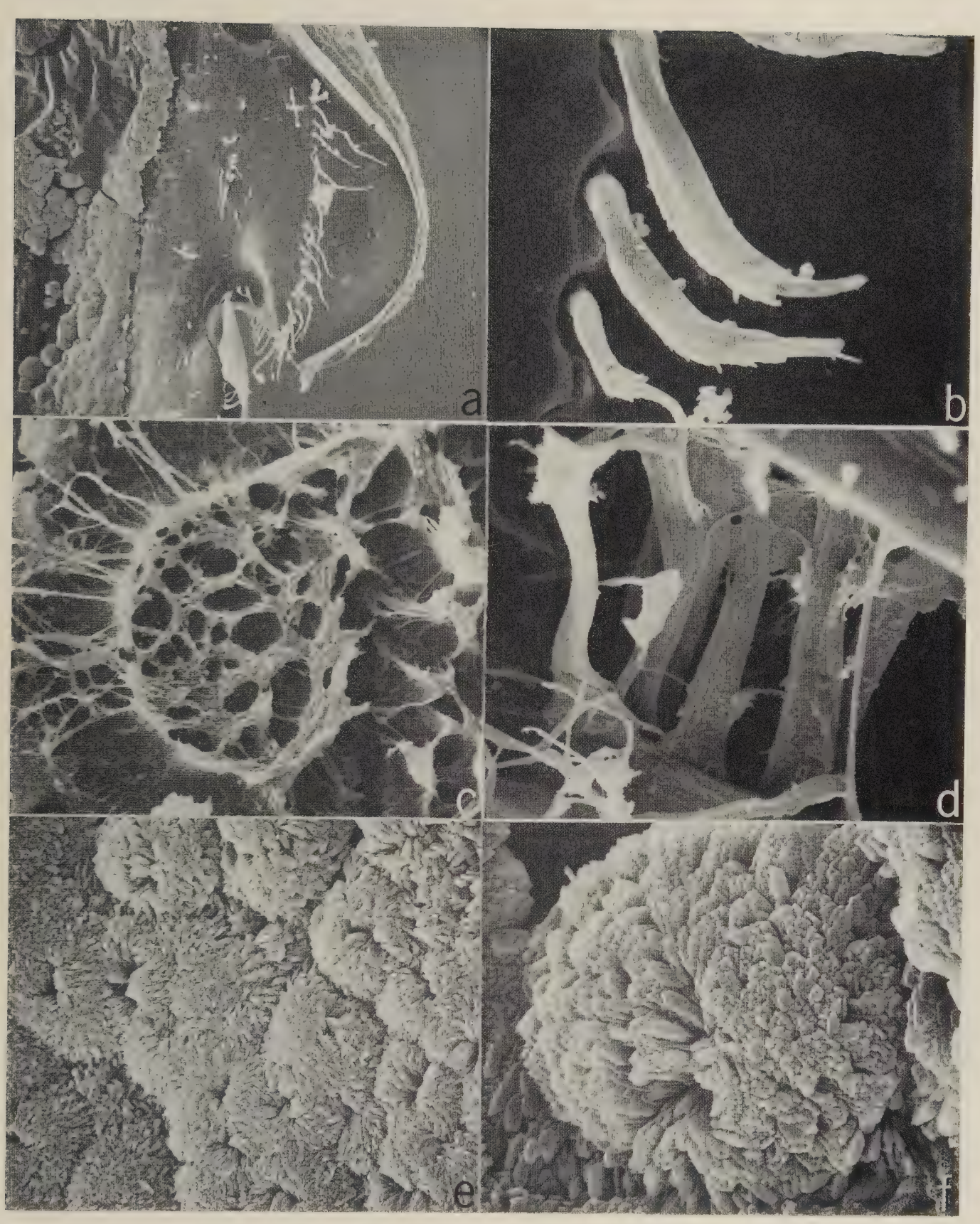

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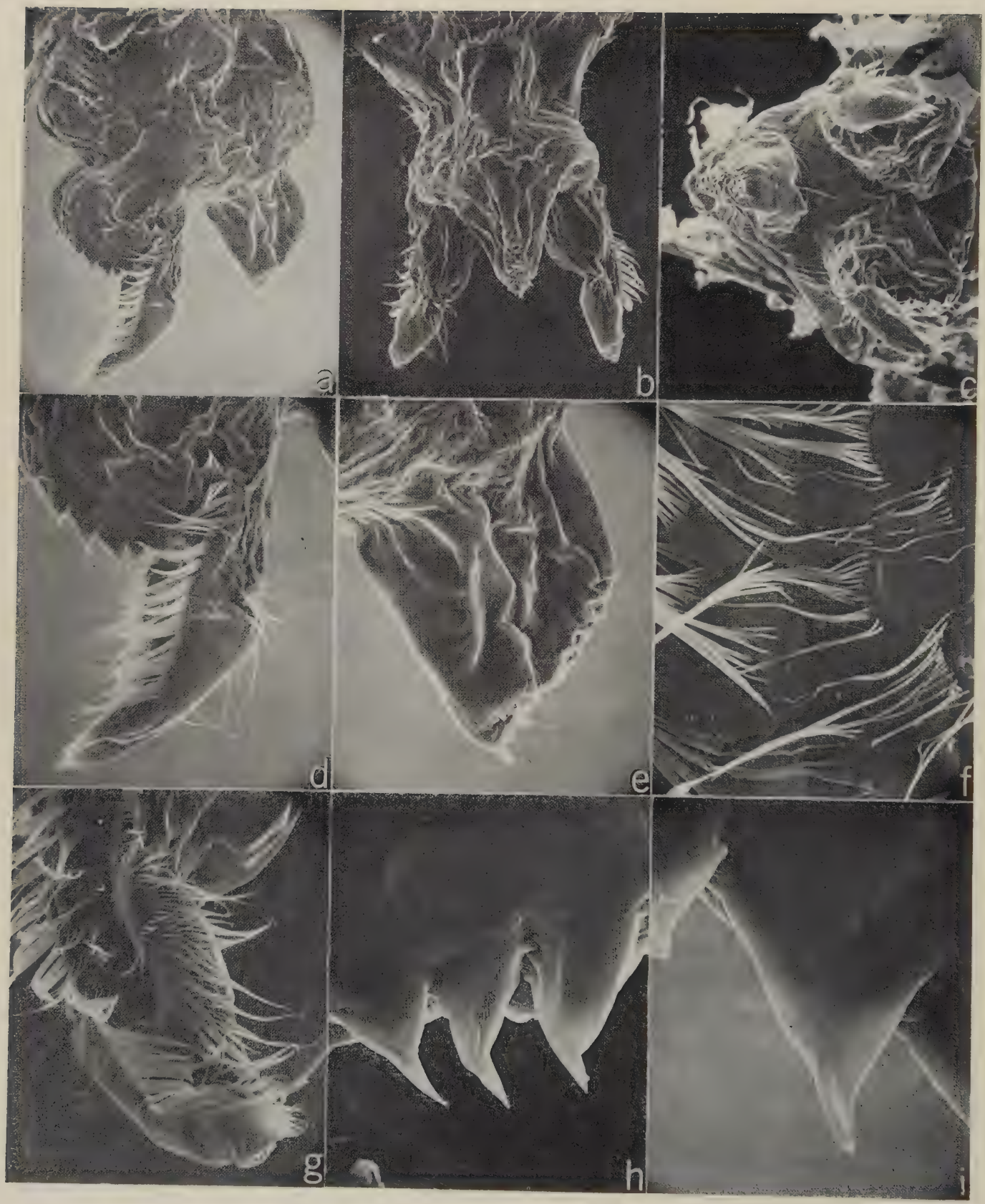


PLATE 12. *Cypridinodes concentrica* n.sp.

PLATE 13. *Cypridinodes concentrica* n.sp.

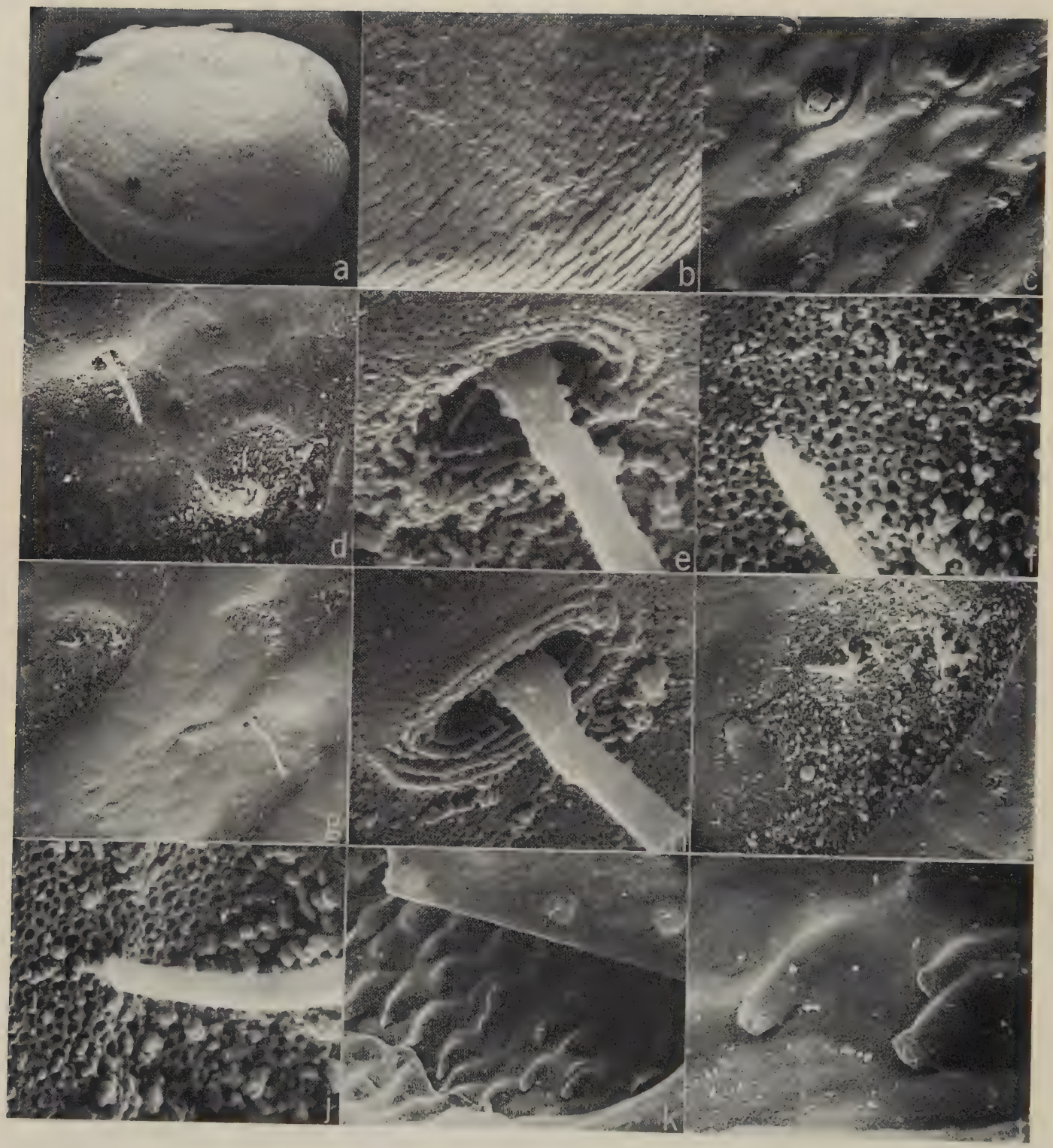
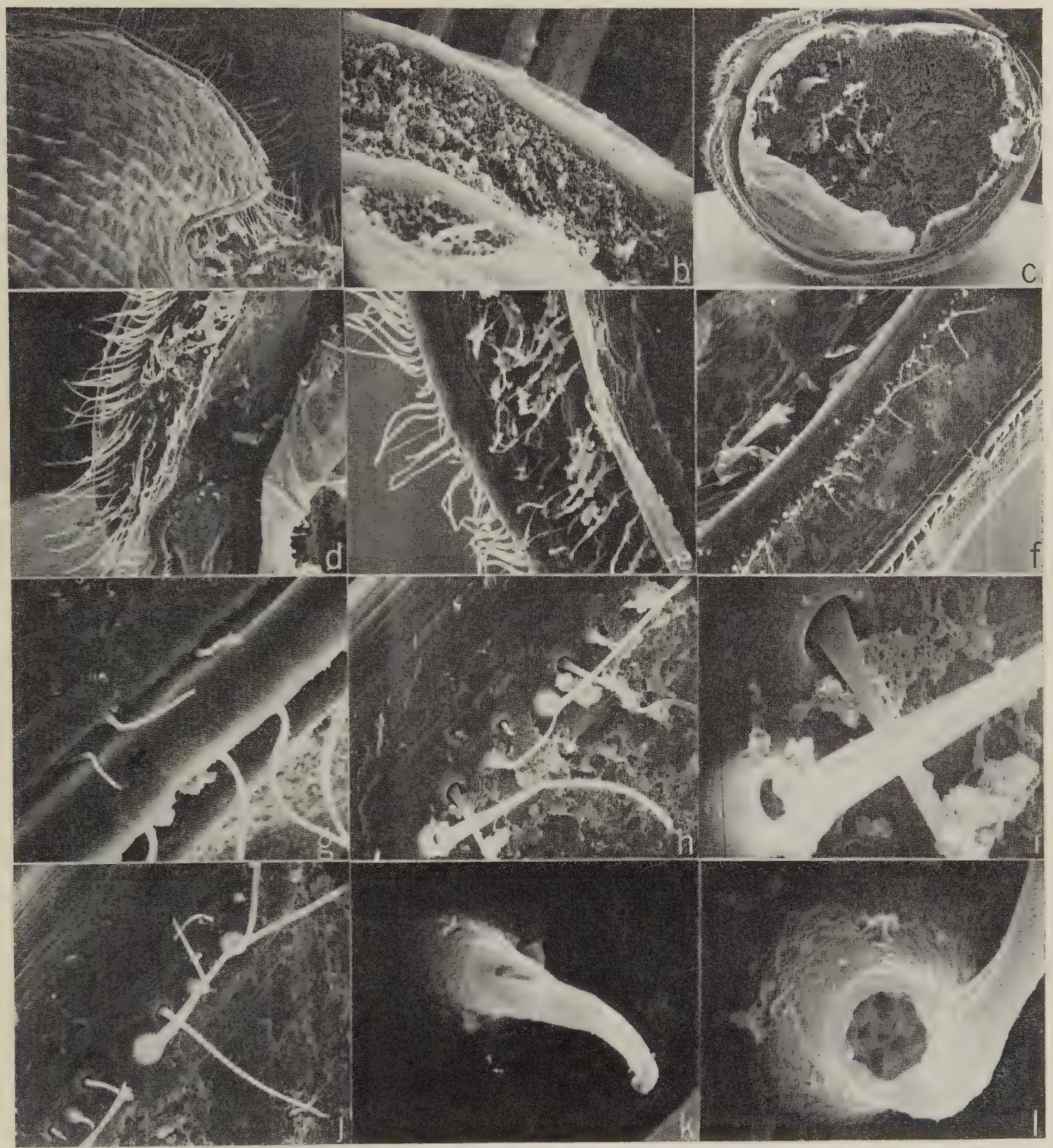


PLATE 14. *Cycloleberis zealandica*



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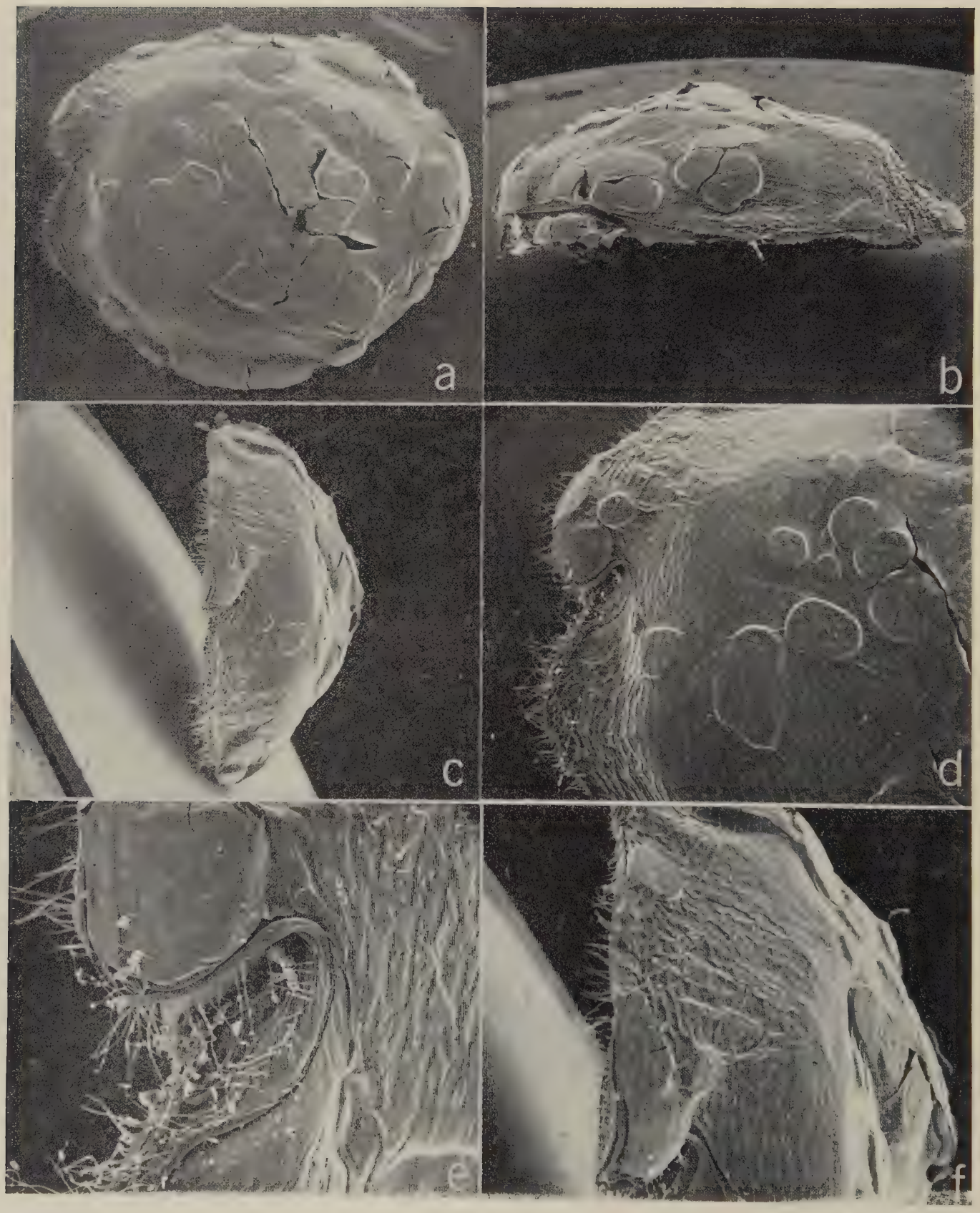


PLATE 16. *Cycloleberis zealandica*

PLATE 17. *Cycloleberis zealandica*

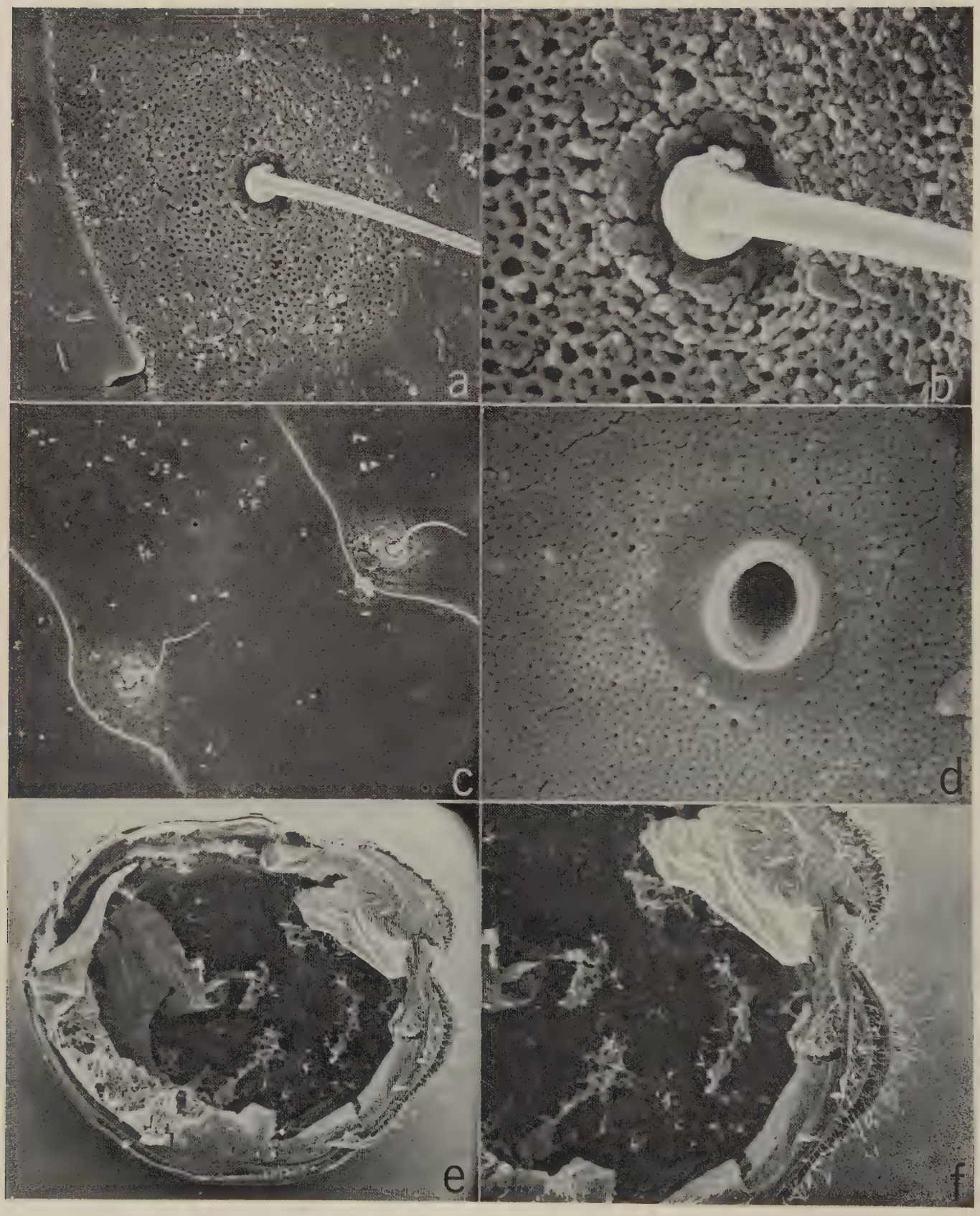
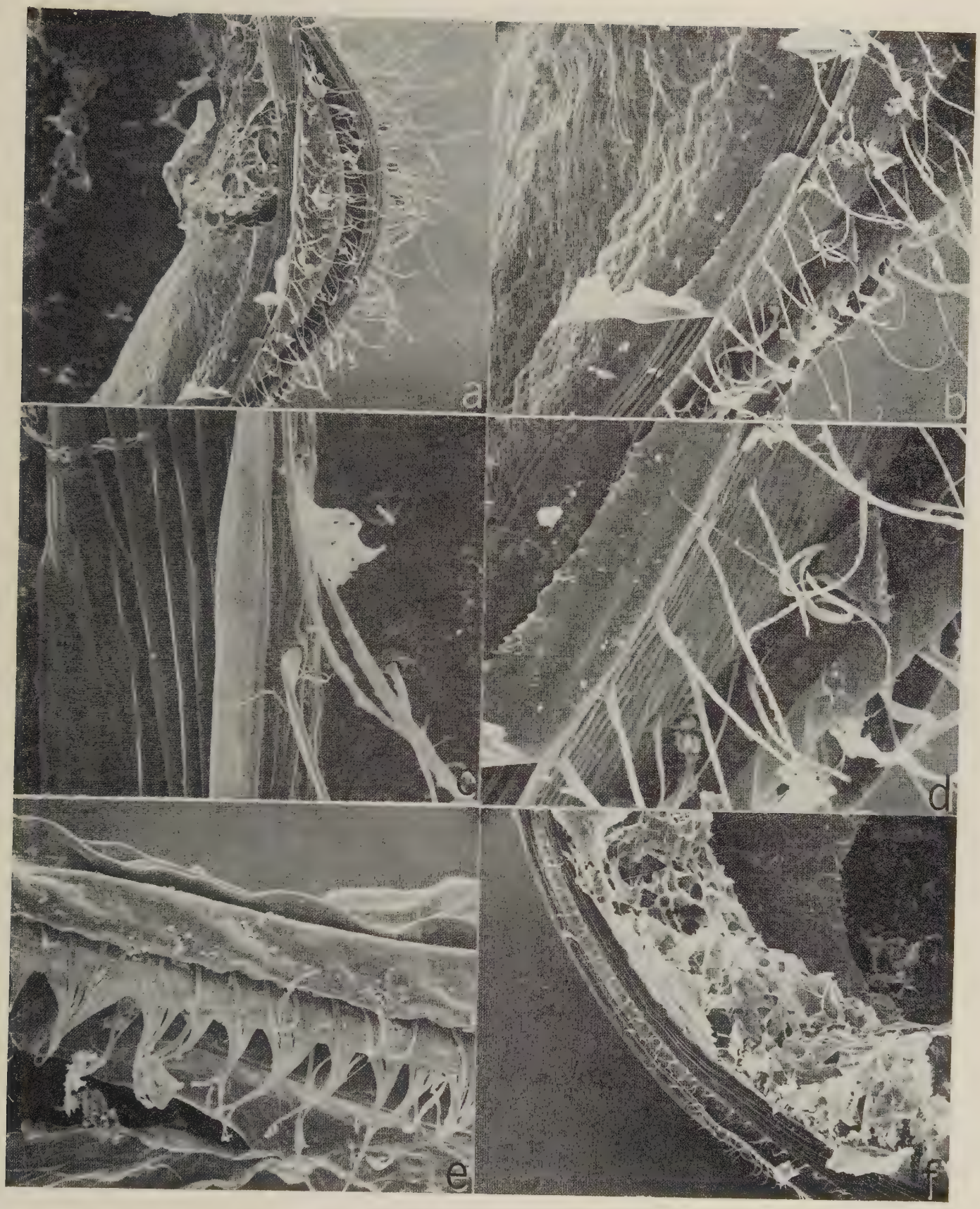


PLATE 18. *Cycloleberis zealandica*



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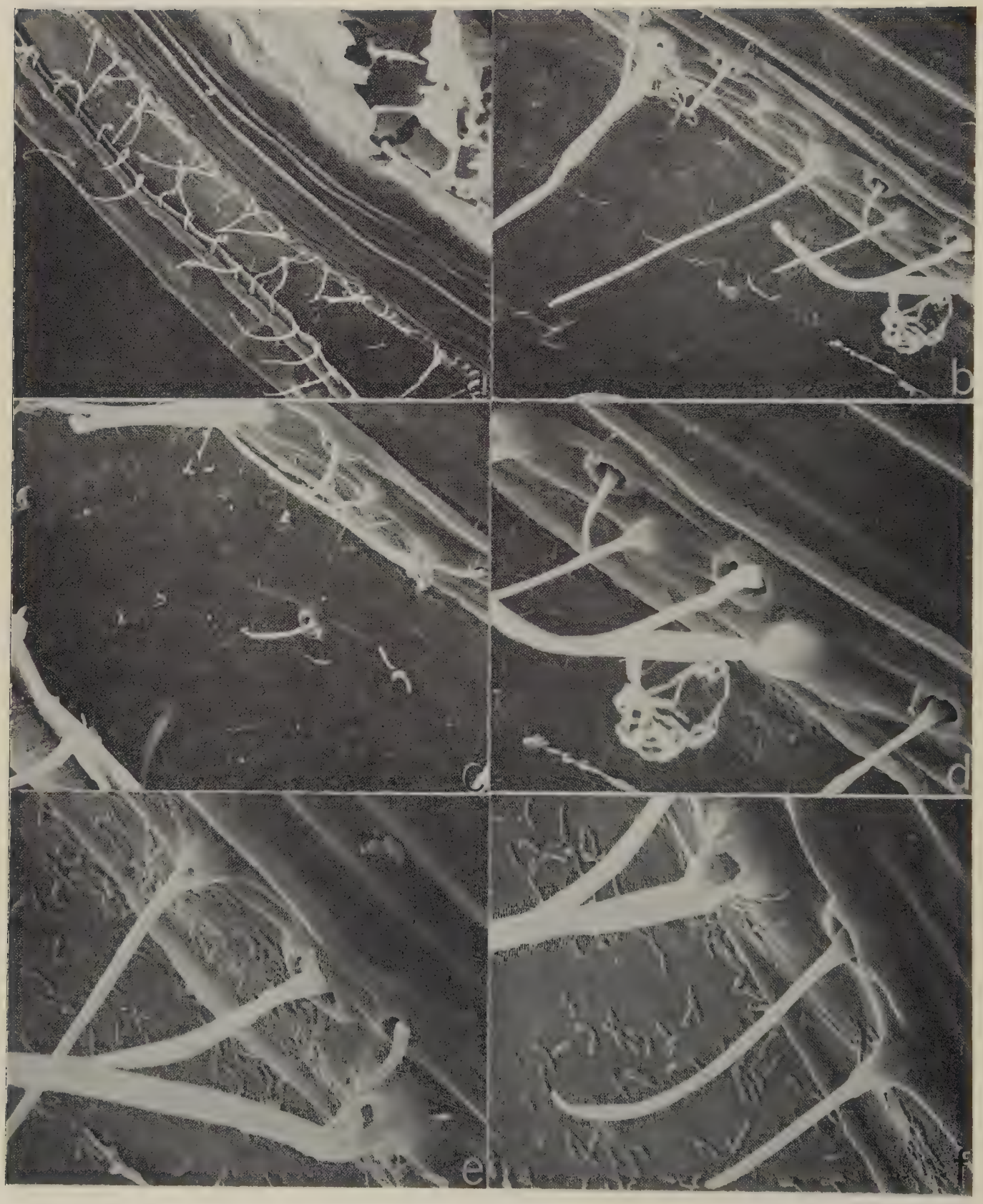

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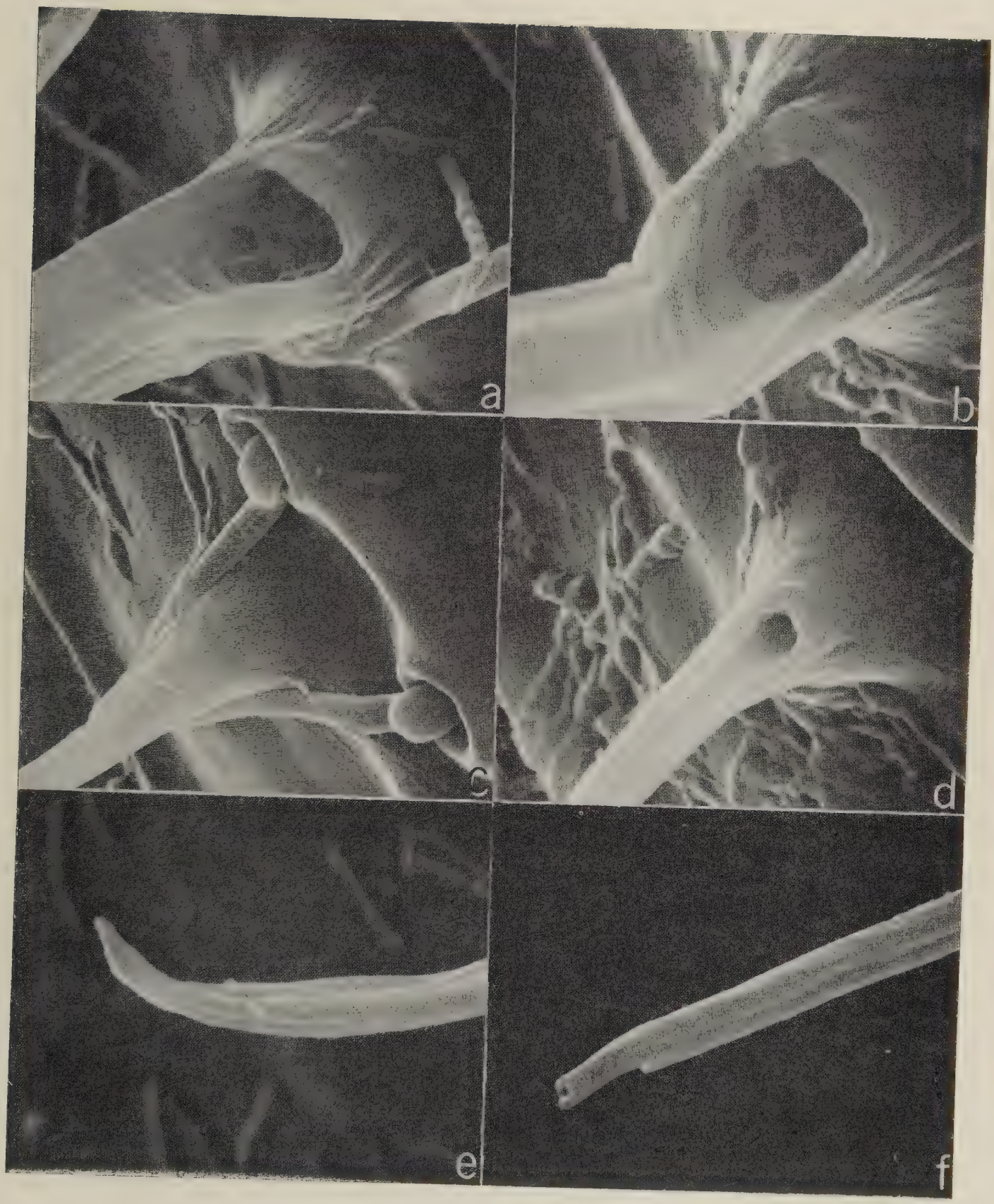

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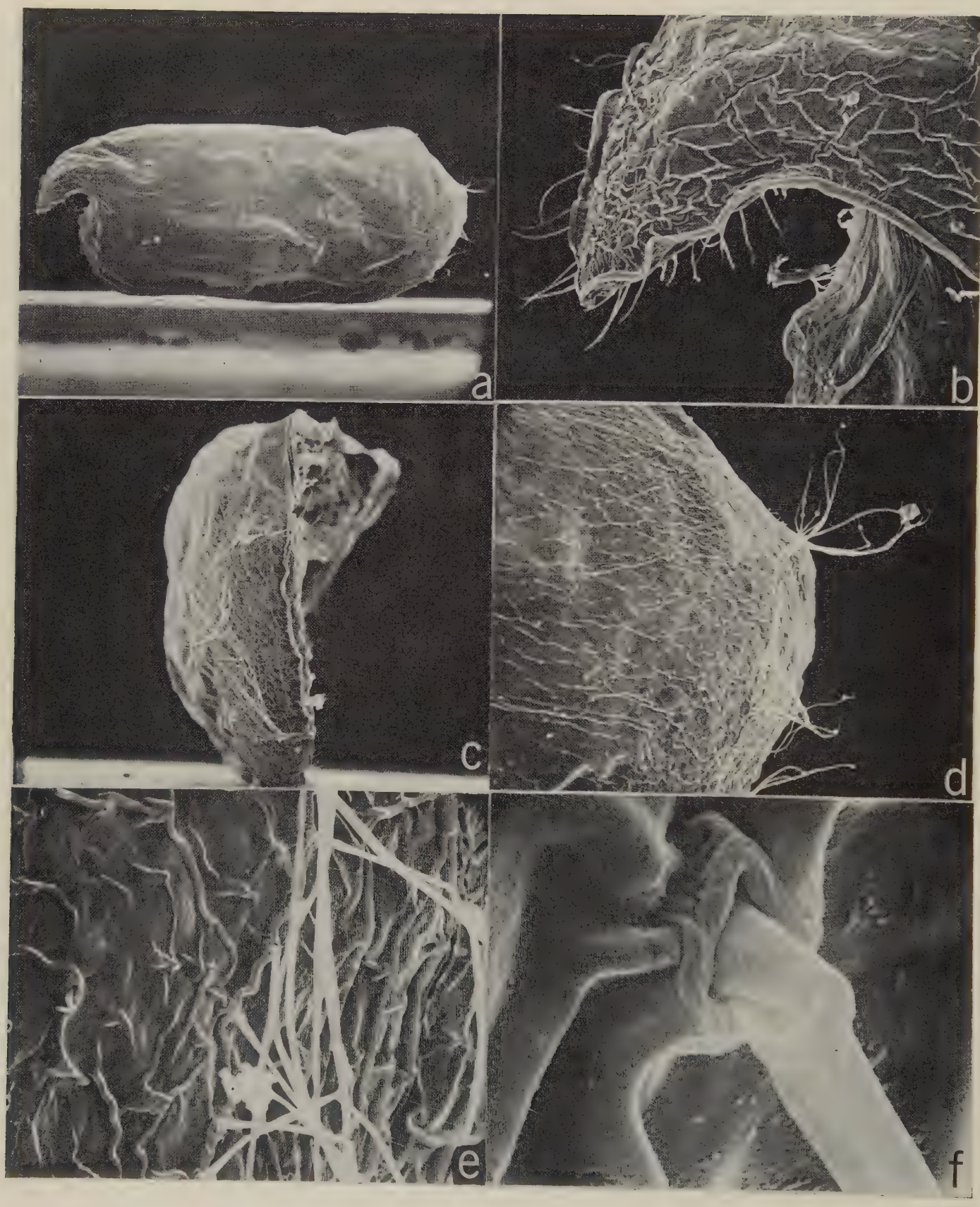
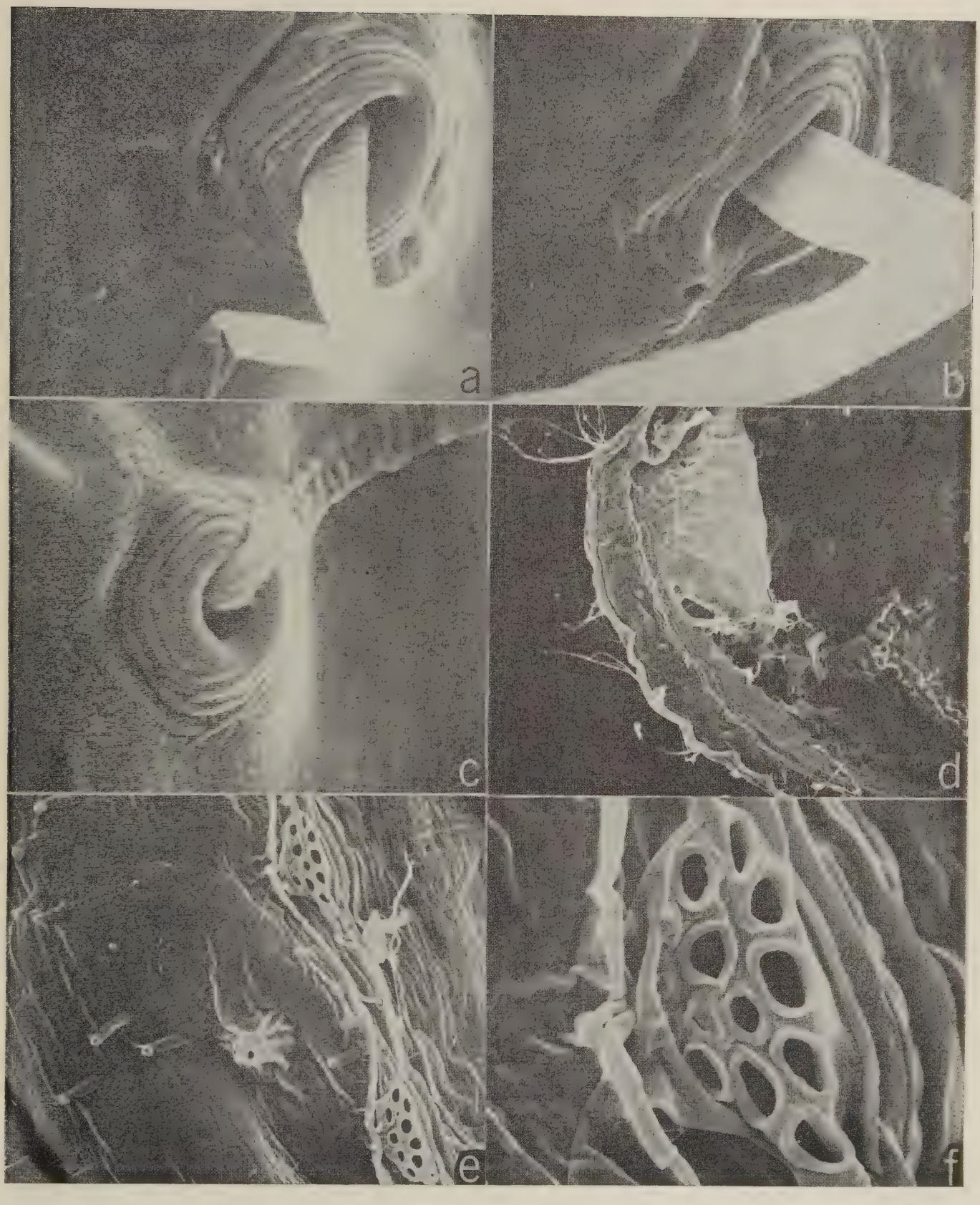


PLATE 22. *Diasterope grisea*



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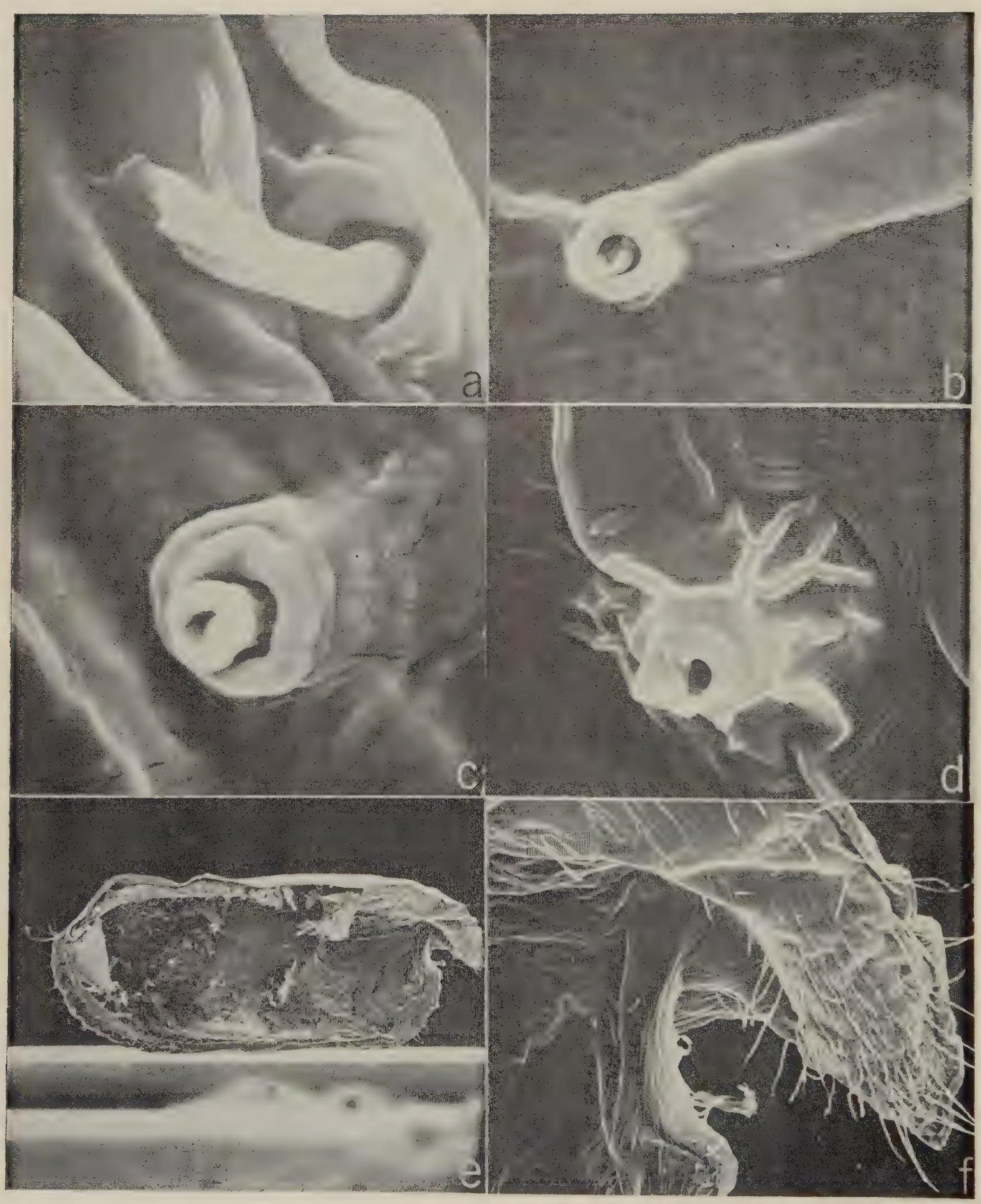

PLATE 24. *Diasterope grisea*

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